



2016

# Natural Resources Assessment and Co-Occurrence Mapping

City of Somersworth, New Hampshire

# 2016 Natural Resources Assessment

## City of Somersworth, New Hampshire



Prepared by:  
The Strafford Regional Planning Commission with  
The Somersworth Conservation Commission and  
City of Somersworth

September 21, 2016

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# I. Introduction

Natural resources provide critical habitat and ecological services in the City. In urban areas, competing land uses, development pressure, high land values, and dense settlement constrain and threaten high quality natural resources. Identifying and prioritizing key areas for conservation and protection is key to providing habitat for wildlife, preserving rare or sensitive species and ecosystems, and ensuring the sustainability of the ecological services that support a high quality of life in Somersworth. Local land conservation and natural resource protection impacts regional habitat availability and connectivity and water quality all the way to the Great Bay Estuary.

**Ecosystem Services**

Ecosystem services are the life-sustaining benefits and services that natural systems provide, such as flood storage, food and water production, cultural and recreational opportunities, and nutrient cycling.

(Source: EPA)

## Mapping

The foundation of this Natural Resources Assessment (NRA) is a map-based Geographic Information Systems (GIS) inventory of the City's existing natural resources. Six primary natural resource maps were developed to display and analyze topography, agricultural resources, water resources, conservation and unfragmented lands, habitats identified in the NH Wildlife Action Plan (WAP), and the highest ranked habitat areas identified in the WAP. A build-out analysis was conducted to map and identify areas of the City where potential future development may occur. The final step of this NRA was the creation of a co-occurrence map that identifies the presence of multiple key natural resources. A brief analysis of each of these maps is included in this document. A large 36x36" map set was developed as part of this NRA and is available at the Somersworth Planning Department.

## Process

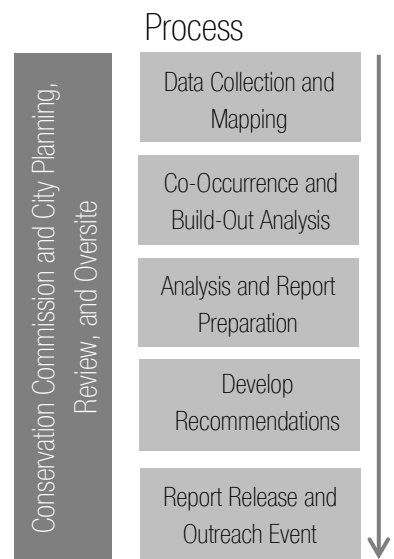
This Natural Resources Assessment was developed through an iterative process. Figure 1 displays the key steps in this process. The Conservation Commission and City staff were highly involved in this process and reviewed and refined the maps, analysis, and recommendations. Refer to the Appendix for a description of the data inputs and methodology for the build-out and co-occurrence mapping.

## Recommendations

The priority conservation areas included in this document were developed based on the co-occurrence analysis and data obtained in the map set. In addition to conservation areas, general strategies for outreach, management, and regulatory action are included.

## Intended Use

The information in this NRA is intended to provide information about specific habitats and resources—at both the site and city-scale—that can support land use decisions and conservation priorities. This NRA provides a benchmark for observing short and long term changes, and it should be updated as conditions change and when new information is available. This baseline assessment may be refined through field investigations and ground truthing and further developed into a comprehensive Natural Resources Inventory. The NRA may be incorporated into the City's Master Plan and other planning documents. It is intended to serve as an informational tool that may inform future changes in zoning, land use regulations, and policies. Finally, it is an educational resource for City staff, boards, students, residents, and other interested individuals.



## II. Project Objectives

- Increase identification and understanding of the City's natural resources
- Develop information that can inform decisions about balancing development and conservation
- Promote and support collaboration between departments
- Identify resources that are potentially at risk
- Develop an educational resource for the City and the public
- Increase public awareness about the need to conserve at-risk resources for future use and knowledge of the criteria used to determine the most valuable sites
- Identify natural resources that interact as systems
- Synthesize categories of data to help model outcomes of policy decisions
- Provide a visual resource that can be used as a reference for collaboration among departments and committees
- Capture a snapshot of the city's natural resources for use as a baseline in tracking land use trends
- Compile preliminary information that may be used for a comprehensive NRI or Conservation Action Plan
- Work towards improving and protecting water quality in the Piscataqua Region watershed

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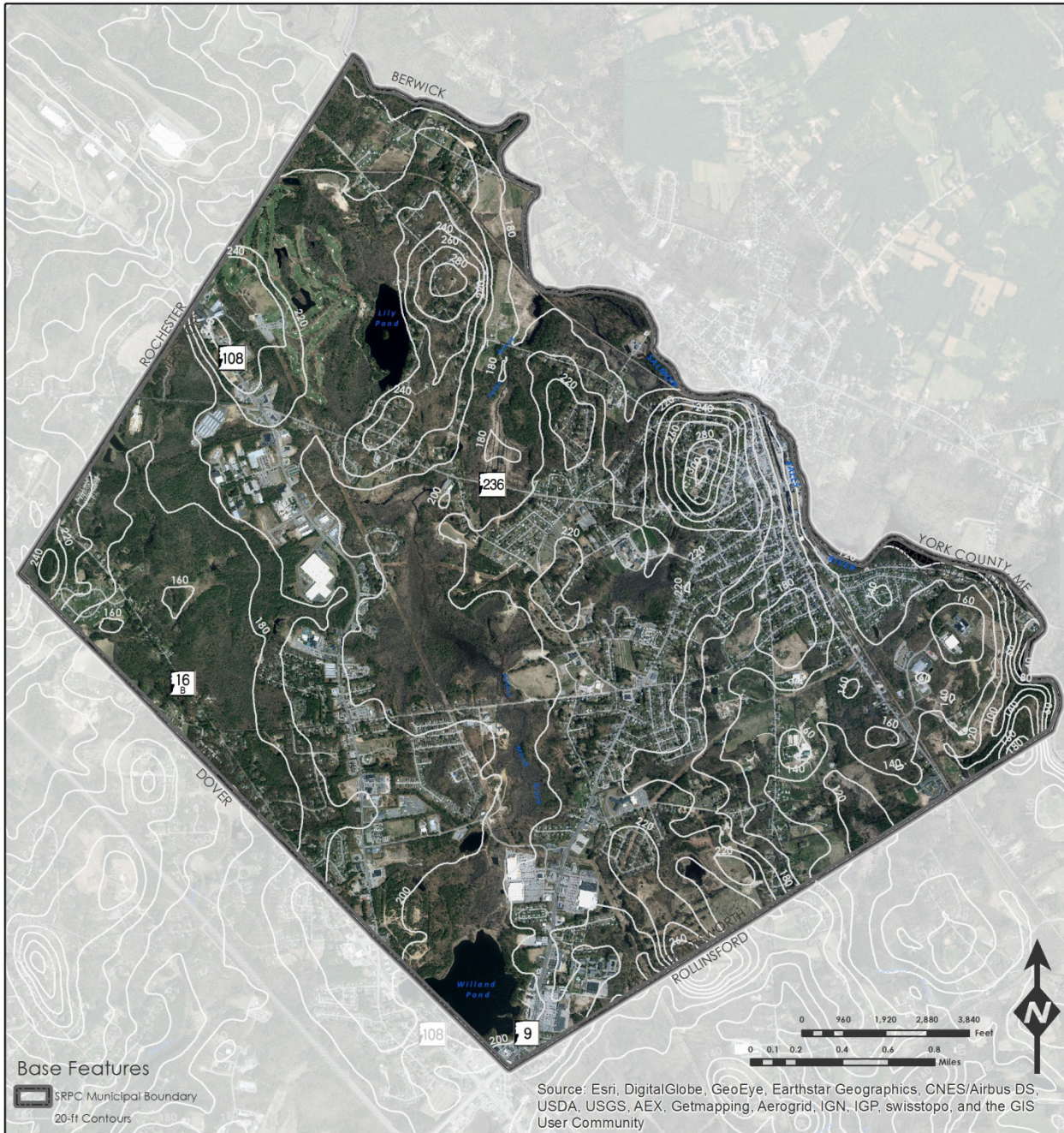
*Somersworth Master Plan Vision 2020 Goal:*

*Preserve and protect its open space and natural resources in balance with economic, business and employment opportunities for its citizens.*

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# III. Natural Resources Map Assessments

## 1. Aerial and Topography



**Map Feature Notes:**  
 Contour ID #4453 was removed per the request of the Somersworth Conservation Commission.

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**Data Sources**

Base features are from USGS 1:24,000 scale Digital Line Graphs, as archived in the GRANIT database. Digital data in NH GRANIT represent the efforts of the contributing agencies to record information from the cited source materials. Complex Systems Research Center (CSRC), under contract to the Office of Energy & Planning (OEP), and in consultation with cooperating agencies, maintains a continuing program to identify and correct errors in these data.

Neither OEP nor CSRC make any claim as to the validity or reliability or to any implied uses of these data.

Digital tax parcels taken from SRPC database. Data should be used for planning purposes only. Data was derived from various sources and were updated at different timeframes, with varying levels of accuracy.

Street names are maintained internally by SRPC staff. Please notify SRPC of any missing or inaccurate street names.

**Map 1: Aerial and Topography**

# Topography

*Map 1: Aerial and Topography* displays aerial imagery of the City with 20-foot contour lines that portray the shape and elevation of the land. The topography of the land, including hills, valleys, steep slopes, and plateaus, influences factors such as precipitation, soil moisture, sunlight, temperature, and wind. These factors create microclimates, habitats, and biodiversity. They also may be a determining factor of the suitability of a site for development because of steep slopes and ledge.

## Elevation

The elevation of Somersworth ranges from 72 feet to 314 feet above sea level.<sup>1</sup> The highest point occurs in an area known as 'The Hill,' a residential neighborhood near the City's downtown. Elevation along the Salmon Falls River ranges from 170 feet in the north to 72 feet above sea level in the eastern corner of the City. The lowest elevations occur in the eastern corner of Somersworth along the Salmon Falls River. The land along the Route 108 corridor lies relatively flat at 200 feet above sea level.

## Steep Slopes

There are approximately 19 acres of steep slopes, defined as slopes greater than 25 percent, in Somersworth. Steep slopes are found along the Salmon Falls River near Canal Street and Winter Street. Malley Farm, on the eastern side of the City, has over five acres of steep slopes. Other areas of steep slopes include the land on east side of Lily Pond and east of Granite Way.

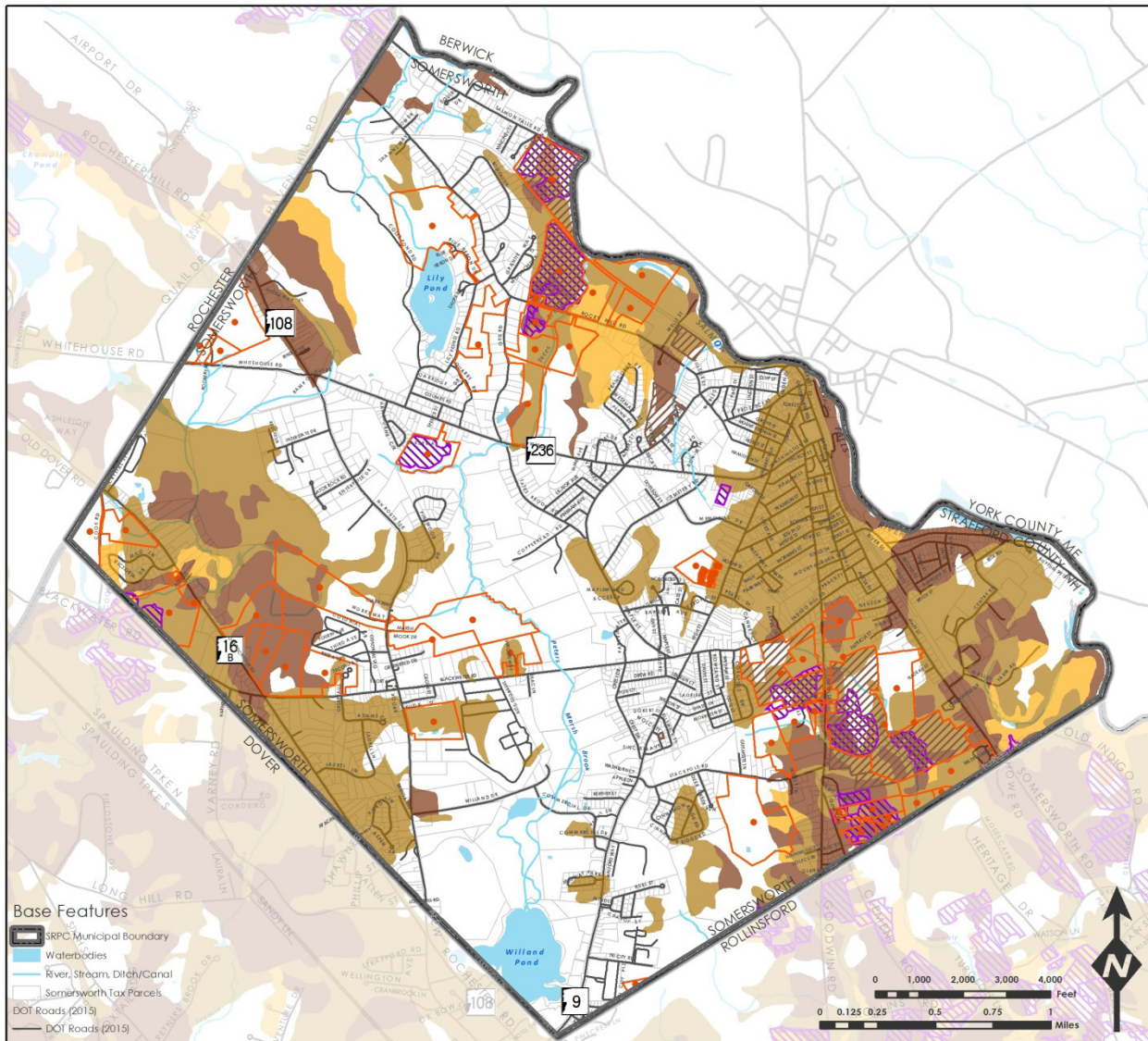


**Figure 1. Hillshade image of Somersworth with steep slopes in red.**

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<sup>1</sup> Elevations based on LiDAR data from UNH Granite

# 2. Agricultural Resources



### Map Features

- Parcels in Current Use (City of Somersworth)
  - ▭ Parcels in Current Use (City of Somersworth)
  - ▨ Current Farming and Agricultural Activities (City of Somersworth)
  - ▤ Agricultural Land/Infrastructure (2010 SRPC Land Use)
- Agricultural Soil Classification (NRCS)
- All areas are prime farmland
  - Farmland of local importance
  - Farmland of statewide importance

### Map Feature Notes

Soils data were derived from the Natural Resource Conservation Service (NRCS) Strafford County Soil Survey, 1973.

Current Farming and Agricultural Activities were digitized by SRPC staff on 04/01/2016 per recommendations by the City of Somersworth staff. As of that date, there were no known "active" farms within the City. The following data sources were used to identify other agricultural uses.

1. Land Use Codes (LUC) relating to farming and agriculture. There are four LUC's that directly relate to farming/agriculture and four other LUC's for Mixed Res/Com Current Use.

2. Agricultural Zoned Property

3. City of Somersworth Code Enforcement Office

Current Use data provided by the City of Somersworth and digitized by SRPC.

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**Map 2: Agricultural Resources**



# Agricultural Resources

Land use data, agricultural zoned property, city staff knowledge, and current use data were used to identify agricultural uses in the City for this NRA. At the time this report was prepared, there were no known “active” farms within Somersworth; however, the City has agricultural land uses and farmland soils. Roughly eight percent of the City falls within the Agricultural zoning district, which is characterized by agricultural lands, single family detached housing, and lands not suitable for development because of soils, slopes, and permanent development easements.

## Agricultural Land

Land use data indicates the presence of agricultural land within the City.<sup>2</sup> Approximately 188 acres of land in Somersworth are classified as agricultural land. This represents about three percent of the total land area of the City. As shown in purple on *MAP 2: Agricultural Resources*, nearly half of agricultural land is located on the southern side of the City adjacent to the Town of Rollinsford.

## Current Use

A total of 63 parcels of the approximately 3,500 parcels<sup>3</sup> in Somersworth have a portion of their land in current use. Of parcels that are in current use, roughly 82 percent (1,141 acres) of the total area of these parcels is in current use. Land that is in current use is undeveloped land that is assessed and taxed at a rate consistent with its agricultural or forested use. In order for land to be put in current use, it must meet minimum acreage and land use requirements (see box, right). Parcels in current use are depicted on *MAP 2: Agricultural Resources* in orange-red.

## Soil Types

The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Strafford County Soil Survey (1973) identified 55 different types of soils in Somersworth.<sup>4</sup> The four most prevalent soils in Somersworth, Hinckley Loamy Sand series, Muck and Peat, Hollis-Charlton Fine Sandy Loams, and Saugatuck Loamy Sand, account for almost half of the soils in the city. The most prevalent soil type in Somersworth is Hinckley Loamy Sand.

The Hinckley series consists of deep, excessively drained soils that formed in deposits of stratified sand and gravel. Saturated hydraulic conductivity – or ease with which water can move through the soil - of this series is high to very high and the mean annual temperature is about 45 degrees F. The Hinckley loamy sand, 0-3% slopes (HaA) soil is typically found on plains and terraces. Due to potential ‘droughtiness’, low natural fertility, and cobblestones, these soils may not be suitable for agriculture. Hinckley loamy sand, 3-8% slopes (HaB) are also commonly found on plains and terraces and have similar characteristics that make them less suitable for agriculture. Additionally,

### Acreage requirements for Current Use:

- Farm Land: 10 acres or more, unless land is producing \$2,500 or more per year in agriculture or horticulture crops—then any size.
- Forest Land: 10 acres or more.
- Unproductive (incapable of producing a farm or forest crop): 10 acres or more.
- Wetlands: Any size (Can include an optional 100 foot buffer around the wetland if unimproved land left in natural state).
- Any combination of farm, forest, and unproductive land including wetlands: 10 acres or more.

(Source: UNH Cooperative Extension)

<sup>2</sup> Land use data is based on 2010 aerial imagery that was digitized by SRPC and classified into 39 categories. There are two land use codes (LUCs) for agricultural land.

<sup>3</sup> There are 3501 parcels in Somersworth according to the best available GIS data from 2012.

<sup>4</sup> Soil Survey of Strafford County, New Hampshire. USDA Soil Conservation Service (1973)  
[http://www.nrcs.usda.gov/Internet/FSE\\_MANUSCRIPTS/new\\_hampshire/straffordNH1973/strafford.pdf](http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/new_hampshire/straffordNH1973/strafford.pdf)

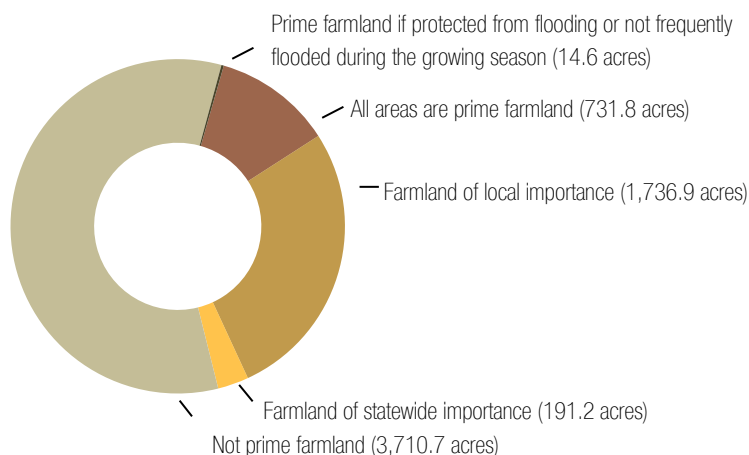
erosion can be a hazard if these soils are cultivated. Hinckley loamy sand, 8-15% slopes (HaC) is prone to drought and has a thin surface layer and low organic content. HaC typically occupies short, irregular slopes on terraces.<sup>5</sup>

## Agricultural Soil Classification

Important farm classes were defined in New Hampshire for the purposes of carrying out the provisions of the Farmland Protection Policy Act of 1981. The Act was established to minimize the extent that federal programs contributed to unnecessary conversion of farmland to non-agricultural uses and to assure compatibility and consistency of federal, state, and local programs and policies to protect farmland. This classification helps identify important agricultural areas.

According to the USDA NRCS, prime agricultural soils account for 11.5 percent (732 acres) of the area of Somersworth. The USDA defines prime farmland as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Prime farmland soils are important to meeting food and fiber needs. See box, right, for prime soil criteria.

Within Somersworth, 191 acres (three percent of the land area) are designated soils of statewide importance, or land that is not prime or unique but important for the production of food, feed, fiber, forage, and oilseed crops in the state.<sup>6</sup> Farmland of local importance accounts for just over 27 percent (1,737 acres) of Somersworth. Soils of local importance have specific properties that are favorable to regional agriculture and crops. In Strafford County, these soils are poorly drained, have artificial drainage established, and are being farmed. These soils were identified by the Strafford County Conservation District Board.<sup>7</sup>



## Prime Soil Criteria

- Prime Farmland Soils that have an aquic or udic<sup>†</sup> moisture regime and sufficient available water capacity within a depth of 40 inches to produce the commonly grown cultivated crops adapted to New Hampshire in 7 or more years out of 10.
- Soils that are in the frigid or mesic temperature regime.
- Soils that have a pH between 4.5 and 8.4 in all horizons within a depth of 40 inches.
- Soils that have either no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow cultivated crops common to New Hampshire to be grown
- Soils that have a saturation extract less than 4 mmhoc/cm and the exchangeable sodium percentage is less than 15 in all horizons within a depth of 40 inches.
- Soils that are not frequently flooded during the growing season (less than a 50% chance in any year or the soil floods less than 50 years out of 100.)
- The product of the erodibility factor times the percent slope is less than 2.0 and the product of soil erodibility and the climate factor does not exceed 60.
- Soils that have a permeability rate of at least 0.06 inches per hour in the upper 20 inches.
- Soils, that have less than 10 percent of the upper 6 inches consisting of, rock fragments larger than 3 inches in diameter.

(Source: USDA)

**Figure 2. Acres of farmland soil in Somersworth**

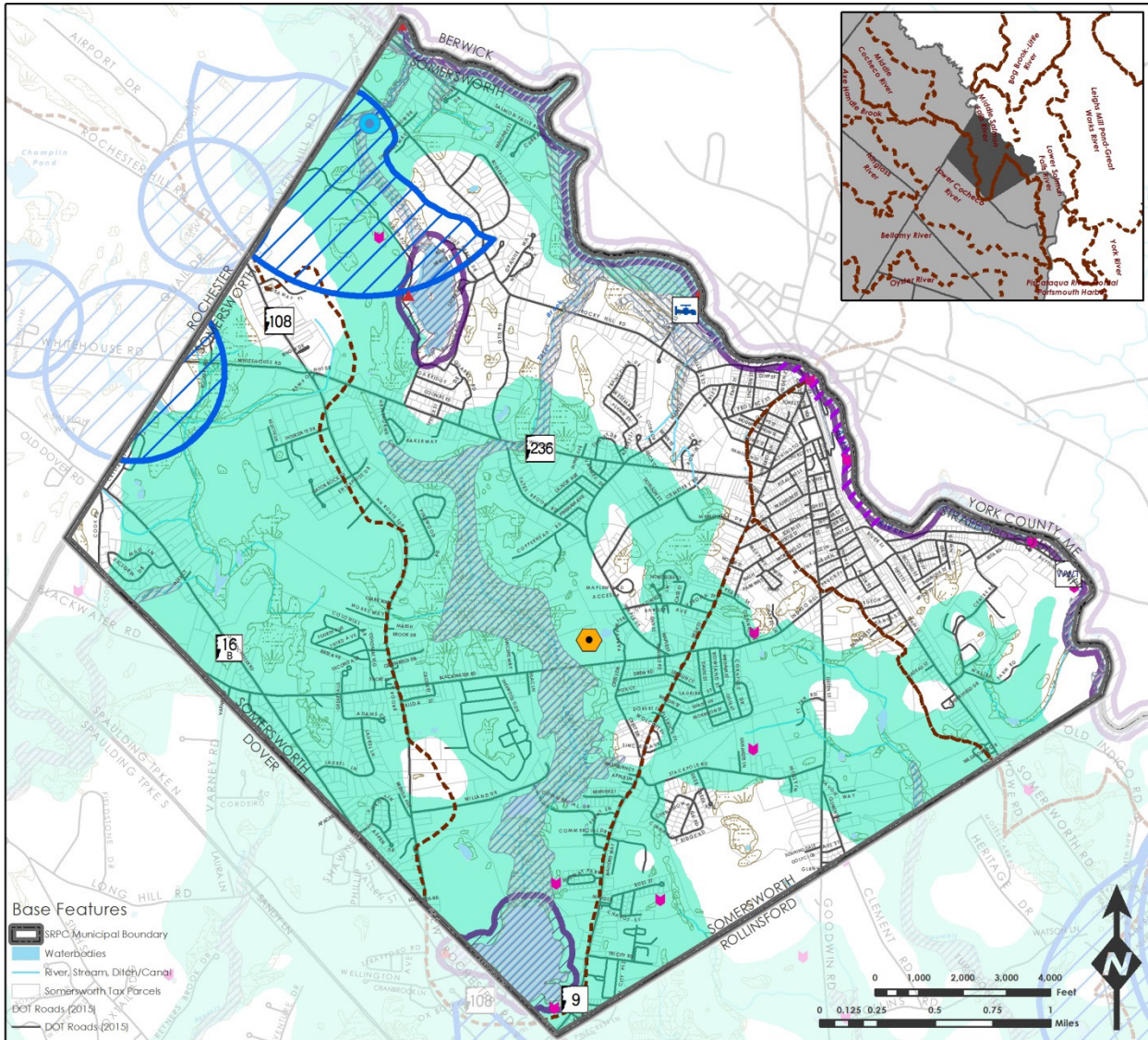
<sup>5</sup> Soil Survey of Strafford County, New Hampshire. USDA Soil Conservation Service (1973) [http://www.nrcs.usda.gov/Internet/FSE\\_MANUSCRIPTS/new\\_hampshire/straffordNH1973/strafford.pdf](http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/new_hampshire/straffordNH1973/strafford.pdf)

<sup>6</sup> New Hampshire Soil Data Dictionary. USDA Natural Resources Conservation Service (2013) [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb1083451.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1083451.pdf)

<sup>7</sup> New Hampshire Soil Data Dictionary. USDA Natural Resources Conservation Service (2013) [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb1083451.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1083451.pdf)

<sup>†</sup>An aquic soil moisture regime is saturated with water long enough to cause oxygen depletion. A udic soil moisture regime is a humid or subhumid climate where rainfall and stored moisture are greater than or equal to the amount of evapotranspiration.

# 3. Water Resources



**Base Features**

- SRPC Municipal Boundary
- Waterbodies
- River, Stream, Ditch/Canal
- Somersworth Tax Parcels
- DOT Roads (2015)
- DOT Roads (2015)

**Map Features**

- Wastewater Treatment Facility
- Water Treatment Facility
- EPA Superfund Site (USEPA)
- Public Water Access Sites (NHDES)
- Active/Exempt Dams (NHDES)

- City Well (Secondary Drinking Water Source)
- SWQPA Urban Exempt Area (NHDES)
- Wellhead Protection Areas (NHDES)
- 100-Year Floodplain (FEMA)
- 500-Year Floodplain (FEMA)
- HUC 12 Watershed Boundaries (USGS)
- SWQPA 250 Foot Buffer (NHDES)
- Stratified Drift Aquifer (USGS)
- NWI Wetlands (USFWS)

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**Map 3: Water Resources**

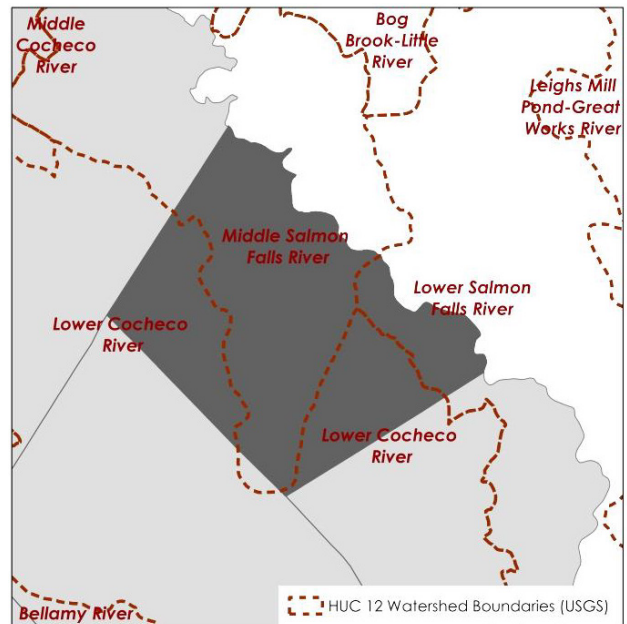
# Water Resources

Water resources are a critical asset in Somersworth, providing habitat for wildlife, drinking water, recreational opportunities, and flood storage. This chapter provides an overview of the watersheds, surface water, floodplains, water infrastructure, and aquifers in the City.

## Watersheds

Somersworth lies within the Piscataqua-Salmon Falls watershed, a 1,685 square mile coastal watershed in New Hampshire and Maine. The City falls within the Lower Cocheco River, Middle Salmon Falls River, and Lower Salmon Falls River subwatersheds. About 62 percent of the precipitation that falls within the City drains to the Lower Cocheco River subwatershed and 38 percent drains to the Salmon Falls subwatershed. Table 1 displays the total area of Somersworth's major watersheds and subwatersheds and the Hydrologic Unit Code of watersheds within the City.

A watershed is an area of land that catches precipitation and drains into a specific waterbody.



**Figure 3. Map of watersheds (HUC12)**

**Table 1. Acreage of watersheds by hydrologic code unit (HUC)**

HUC 8	HUC 10	Total Watershed Area (Acres)	HUC 12	Total Watershed Area (Acres)	Area in Somersworth (Acres)	Percent of Somersworth Area
Piscataqua Salmon Falls Watershed (01060003)	Cocheco River Watershed (0106000306)	118,466	Lower Cocheco River (010600030608)	20,065	2,450.6	38.3
	Salmon Falls River Watershed (0106000305)	1,155,621	Middle Salmon Falls River (010600030506)	38,448	3,215.3	50.3
			Lower Salmon Falls River (010600030507)	13,813	732.5	11.4

## Surface Water

There are approximately 126 acres of lakes and ponds within the City, the largest of which are Willand Pond (66 acres, of which 62 are within Somersworth) and Lily Pond (36 acres). Just under six percent of Willand Pond is located in Dover. Willand Pond is impaired for aquatic life<sup>8</sup> and primary contact recreation<sup>9</sup> because the water degraded and does not meet the water quality standards set by the state.

Somersworth has 6.8 miles of frontage along the Salmon Falls River, a significant natural resource that extends approximately 38 miles from Great East Lake in Wakefield to the Piscataqua River before emptying into the Atlantic Ocean. The Salmon Falls River forms the state boundary between New Hampshire and Maine. Approximately 53 acres of the Salmon Falls River fall within the City's boundary. Portions of the Salmon Falls River are impaired for aquatic life due to the rivers's low pH and dissolved oxygen saturation.<sup>10</sup>

Within the City, there are a total of 14.3 miles of rivers and streams. Blackwater Brook and Twombly Brook drain to the Cochecho River, while Tates Brook, Peters Marsh Brook, and several unnamed streams drain to the Salmon Falls River.

The Salmon Falls River, Willand Pond, and Lily Pond are protected by the Shoreland Water Quality Protection Act (SWQPA). The SWQPA protects rivers, lakes, and ponds by limiting development and disturbance to natural land cover within a 250 foot buffer of certain waterbodies.<sup>11</sup> A significant portion of the City's downtown frontage on the Salmon Falls River (extending from around Linden Street to River Street) is exempt from the SWQPA due to the presence of urban conditions.

According to the U.S. Fish and Wildlife Service National Wetlands Inventory (NWI), wetlands account for approximately 18 percent of the total area of the City. Wetlands will be described further in Chapter VI Section 5 Wildlife Action Plan Habitats.

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*Somersworth should consider both regulatory and non-regulatory strategies to continue to protect its valuable natural resources. Particular effort should be invested in the restoration and long-term protection of Willand Pond and the adjacent wetland complexes.*

*-Somersworth Master Plan Vision 2020*

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**Figure 4. Willand Pond Trail Map (Prepared by SRPC)**

**Salmon Falls River (Image Credit: Anglerweb.com)**

<sup>8</sup> Impairments are due to chlorophyll-1, dissolved oxygen saturation, dissolved oxygen, total phosphorus, pH (Source: NHDES 303(d) Draft 2014 2014 List of Threatened or Impaired Waters that Require a TMDL (Total Maximum Daily Load) (<http://des.nh.gov/organization/divisions/water/wmb/swqa/2014/documents/2014-draft-303d.pdf>))

<sup>9</sup> Impairments are due to cyanobacteria, hepatotoxic microcystins (Source: NHDES 303(d) Draft 2014 2014 List of Threatened or Impaired Waters that Require a TMDL (Total Maximum Daily Load) (<http://des.nh.gov/organization/divisions/water/wmb/swqa/2014/documents/2014-draft-303d.pdf>))

<sup>10</sup> NHDES 303(d) Draft 2014 2014 List of Threatened or Impaired Waters that Require a TMDL (Total Maximum Daily Load) (<http://des.nh.gov/organization/divisions/water/wmb/swqa/2014/documents/2014-draft-303d.pdf>))

<sup>11</sup> 4<sup>th</sup> order and higher rivers and streams, designated rivers and river segments, lakes, ponds, and artificial impoundments greater than 10 acres, and coastal waters subject to the ebb and flow of the tide are protected under the SWQPA.

## Floodplains

A floodplain is the low lying ground adjacent to rivers that is prone to flooding. The Federal Emergency Management Agency (FEMA) identifies flood hazard areas that have a one percent chance of being inundated by a flood event in any year. These flood hazard areas are commonly referred to as the 100-year flood. Within Somersworth, there are approximately 600 acres of land within the 100-year floodplain. During the City's Multi-Hazard Mitigation Plan update, City staff identified areas that were not delineated by FEMA that typically flood. This information will be integrated into future FEMA map updates through the Risk MAP Discovery process that the City has participated in.

The 100-year floodplain follows Peters Marsh Brook and Tates Brook from Willand Pond to the Salmon Falls River. Land adjacent to the Lily Pond outfall to the Salmon Falls River along Cole Brook and adjacent to the Salmon Falls River north of Winter Street also has a one percent chance of flooding every year.

Within the City there are approximately 43 acres of land located in the 500-year floodplain adjacent to the Salmon Falls River. These areas have a 0.2 percent chance of flooding annually.

## Aquifer

Approximately 4,216 acres of stratified drift aquifer underlies the City. Stratified drift aquifer consists of layers of sand and gravel. When saturated, these aquifers can supply water to wells or springs. Most of the stratified drift aquifer has a relatively low maximum transmissivity of 2,000 feet squared per day. The City Well is located in the northern corner of Somersworth, where transmissivity is as high as 8,000 feet squared per day.

### Transmissivity

The rate at which groundwater travels horizontally through an aquifer.

According to a 2010 Favorable Gravel Well Analysis, Somersworth has approximately 856 acres that are suitable for high-yield wells that can supply greater than 75 gallons per minute and five acres of land that could support very high-yield wells (greater than 150 gallons per minute). Approximately 34 percent of land suitable for high-yield wells is protected and 55 percent of land suitable for very high-yield wells is protected.<sup>12</sup>

## Drinking Water and Wastewater

The Somersworth Water Works is a community water system that serves nearly every property in Somersworth. The community water system has over 3,300 connections and provides water to residents and many commercial and industrial uses, including Velcro USA and several medical centers.<sup>13</sup> The Salmon Falls River is the City's primary source of drinking water. Finished water production averaged 2.5 million gallons per day in the summer and 1.5 million gallons per day in the winter with a capacity of 3.2 million gallons per day.<sup>14</sup> In 2015, the City withdrew a total of 542 million gallons and an average of 1,486 thousand gallons of water per day from the river.<sup>15</sup>

### Wellhead Protection Areas (WHPA)

The area under which groundwater flows to a producing well. WHPAs for overburdened wells (wells that are not drilled into bedrock) are typically based on a hydrogeological model. (Source: NHDES)

The City has one active public water supply well off Rocky Hill Road. The City withdrew an average of approximately 36,000 gallons of water per day from this gravel well between June and August 2015. NHDES delineated a 518 acre wellhead protection area around this well. Fifty-eight percent of this area lies within Somersworth and 42 percent extends across the municipal boundary into Rochester. Similarly, approximately 28 percent of the wellhead protection area of the City of Rochester's Amazon Park community water system lies within Somersworth.

<sup>12</sup> Source: Society for the Protection of Forests. A guide to Identifying Potentially Favorable Areas to Protect Future Municipal Wells in Stratified-Drift Aquifers. June 2010

<sup>13</sup> NHDES OneStop – Public Water Systems, ID: 2151010

<sup>14</sup> City of Somersworth Water Quality Report 2015

<sup>15</sup> NHDES OneStop - SD ID: 20012-S04

The Somersworth Waste Water Treatment Facility returned approximately 1.3 million gallons per day to the Salmon Falls River in 2014.<sup>16</sup>

## Dams

There are eight active dams in Somersworth. A dam is any artificial barrier that impounds or diverts water which has a height of six feet or greater, is located at the outlet of a great pond, or is an artificial barrier which impounds liquid industrial or commercial wastes, or septage or sewage.<sup>17</sup> The Lower Great Falls dam and the Great Falls Upper dam, both located on the Salmon Falls River, are classified as high hazard and low hazard dams, respectively. Six dams are classified as non-menacing.

## Brownfields and Superfund Site

There are several contaminated or potentially contaminated sites, which are referred to as brownfields, in Somersworth. The City is participating in the Strafford Regional Planning Commission Brownfields Program to identify, assess, and support redevelopment of vacant or underutilized properties.

The City also has one designated Superfund site, the Somersworth Sanitary Landfill. The landfill is a 26 acre disposal facility that operated from the mid-1930s through 1981.<sup>18</sup> These sites and other properties with hazardous materials, petroleum, leaking underground storage tanks, and other hazards pose a threat to the surface water and groundwater quality that the City's residents, ecosystems, and wildlife rely on.

**Table 2. Dams in Somersworth (NHDES)**

Hazard Class	Status	Name	River
H	Active	Lower Great Falls Dam	Salmon Falls River
L	Active	Great Falls Upper Dam	Salmon Falls River
NM	Active	Lily Pond Golf Course Pond	Unnamed Brook
NM	Active	Salmon Falls River Dam II	Salmon Falls River
NM	Active	LRSW Leachate Sump Pond Dam	Runoff
NM	Active	Willand Commons Plaza Detention Pond	Runoff
NM	Active	Indigo Hill Dam	Tributary to Twombly Brook
NM	Active	Fish Pond Dam	Unnamed Stream

### NH Dam Classifications

High Hazard (H) refers to a dam which has a great hazard potential because of the size and location of the structure. The failure or misoperation of high hazard dams will result in the probable loss of human life.

Significant Hazard (S) means that a dam has potential to cause substantial danger if misoperated. Failure would not cause probable loss of life but major economic loss to structures and property, render roads impassable, and cause major public health and environmental issues.

Low Hazard (L) refers to a structure, if it were to fail, would cause no loss of life, low economic and property loss, impassible roads, and result in reversible environmental losses.

A Non-Menace (NM) structure would cause no loss of life or property damage, providing the dam meets specific height and capacity measurements.

**Brownfields** are defined by the Environmental Protection Agency (EPA) as real property, where the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

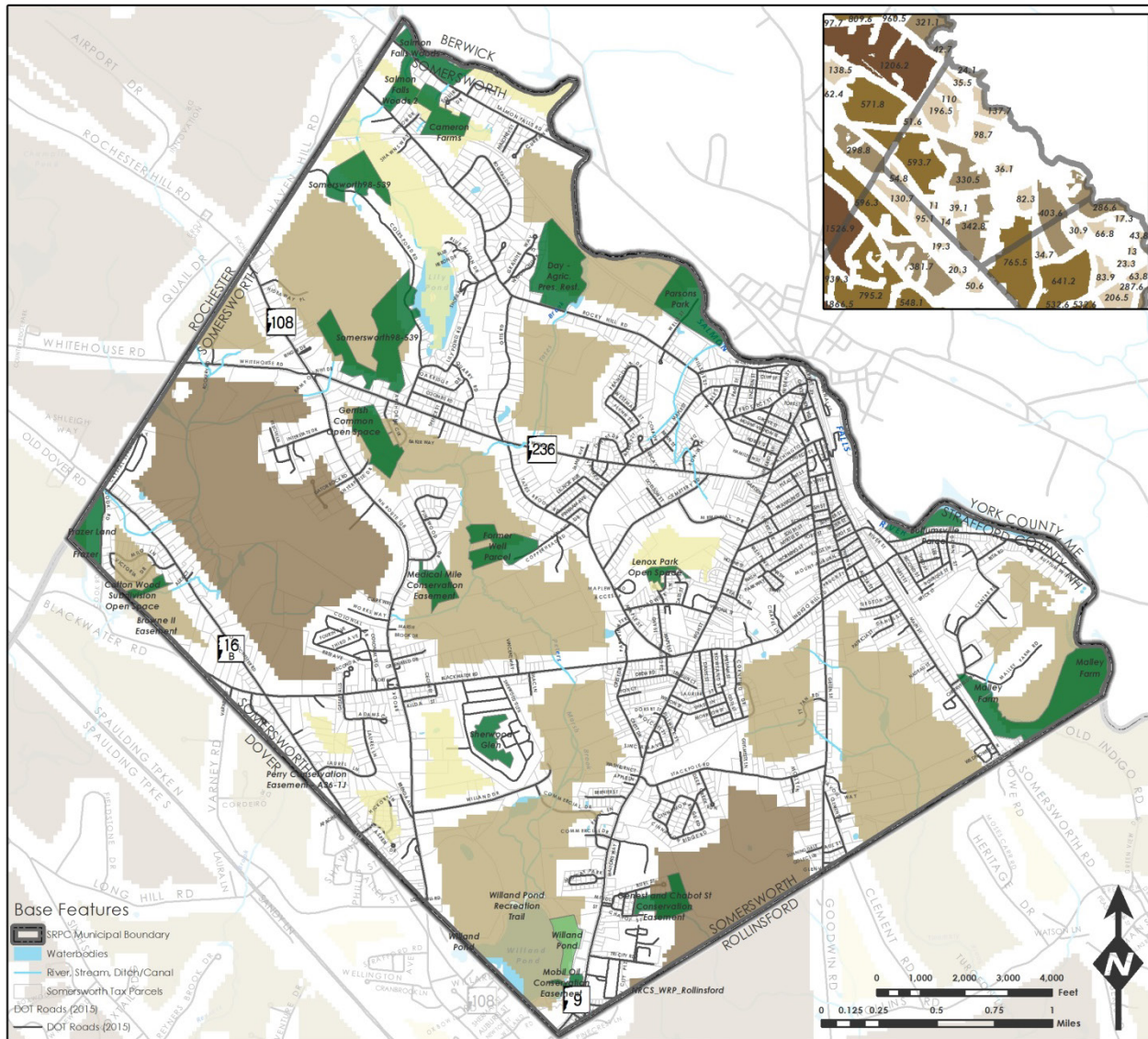
A **Superfund Site** is land that has been contaminated by hazardous waste and identified by the EPA as a candidate for cleanup and placed on the National Priorities List because it poses a risk to human health and/or the environment.

<sup>16</sup> NHDES OneStop – SD ID: 20080-D01

<sup>17</sup> NHDES Dam Bureau, RSA:2, II & Env-Wr 101.09, Revised 09/11/2009

<sup>18</sup> EPA Superfund Program: Somersworth Sanitary Landfill, Somersworth, NH <https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=0101128>

# 4. Conservation and Unfragmented Land



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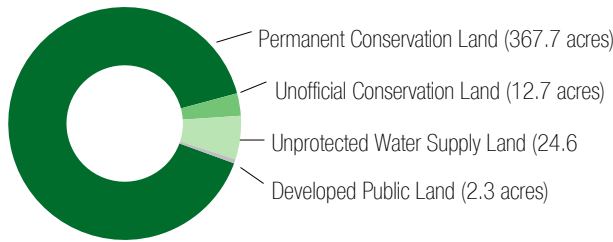


**Map 4: Conservation and Unfragmented Lands**



# Conservation Lands

Conservation land is protected from development through a conservation easement, deed restriction, municipal, state, or federal ownership, or other restriction on development such as designated open space associated with a subdivision. The conservation land described in this chapter is based off the 2016 UNH GRANIT Conservation Lands data layer and shown in *MAP 4: Conservation and Unfragmented Lands*.



**Figure 5. Level of protection**

Conservation land accounts for 6.4 percent of the total land area of Somersworth. Approximately 90 percent of the 407 acres of conservation land in the City is permanently protected conservation land. The remaining conservation land consists of six percent unprotected water supply land, three percent unofficial conservation land, and less than one percent developed public land (Figure 5). Most conserved land is protected through conservation easement or fee ownership (Table 3).

Table 4 lists the 20 conserved properties within the City. Seventeen of these properties are permanently protected. The remaining properties include the City Well Parcel, Willand Pond, and Willand Pond Trail. The City Well Parcel, located near the north corner of the City, is a 20.4 acre parcel owned and maintained with natural cover by the City for the purpose of protecting the public drinking water source. Willand Pond is not permanently protected but owned by the City, which intends to keep the land for conservation and recreational purposes.

The size of conservation land in Somersworth ranges from under five acres to nearly 60 acres, with an average size of 20.4 acres and a median size of 13.9 acres. Malley Farm, a 59.2 acre park located adjacent to the Salmon Falls River and the Town of Rollinsford, is the largest tract of conserved land in Somersworth (Figure 6). The City of Somersworth owns Malley Farm and manages the park both for natural land cover and for recreation and other higher intensity uses. A minimum of 50 percent of the Malley Farm conservation land is to remain a natural landscape. Other larger conservation lands include two city-owned tracts ('Somersworth 98-539') with a combined area of 77.4 acres that were conserved through a New Hampshire Department of Environmental Services Conservation Easement and a 40.1 acre tract protected by the New Hampshire Department of Agriculture, Markets and Food.

Conservation land is scattered throughout the city with more acreage of conservation land in the northeast side of the city than other areas. Three conservation lands, Lennox Park Open Space, Parsons Park, and the Buffumsville Parcel, are located within one mile of City Hall near the City's higher density residential districts.

## Conservation Easement

A permanent legal restriction against future development and other activities as specified in the conservation easement deed.

**Table 3. Type of land protection in Somersworth**

	Number of parcels	Percent of Total Acreage of Conservation Land
Conservation Easement	10	47.1
Fee Ownership	7	41.5
Preservation Restriction	1	9.8
Right of Way	1	0.6
Set Aside Areas of Development	1	1.0



**Figure 6. Aerial image of Malley Farm along the Salmon Falls River**

**Table 4. Conservation land in the City of Somersworth (UNH GRANIT)**

Name	Protection Level	Term of Protection	Mgmt. Status	GAP Status	Access	Primary Protection Type	Primary Protecting Agency/ Organization	Acres
Buffumville Parcel	1	U	3	3	A	FO	Somersworth	9.4
Cameron Farms	1	P	3	3	NA	CE	Somersworth	17.4
Cotton Wood Subdivision Open Space	1	P	3	3	U	SA	Other	4.1
Day - Agric. Pres. Rest.	1	U	3	3	NA	PR	NH Dept of Agriculture	40.1
Former Well Parcel	1	U	3	3	A	FO	Somersworth	22.1
Frazer Land	1	P	3	3	R	CE	Somersworth	13.9
Genest and Chabot St Conservation Easement	1	P	3	3	NA	CE	Somersworth	16.2
Gerrish Common Open Space	1	P	2	2	R	CE	Other	22.2
Lenox Park Open Space	1	P	2	2	NA	CE	Somersworth	4.0
Malley Farm	1	U	3	3	A	FO	Somersworth	59.2
Medical Mile Conservation Easement	1	P	3	3	NA	CE	Somersworth	12.3
Mobil Oil Conservation Easement	1	P	3	3	R	CE	Somersworth	3.7
Parsons Park	1	U	3	3	A	FO	Somersworth	27.3
Salmon Falls Woods	1	P	3	3	U	FO	Somersworth	13.9
Salmon Falls Woods 2	1	P	2	2	A	CE	Somersworth	11.3
Sherwood Glen	1	U	3	3	NA	CE	Somersworth	13.3
Somersworth 98-539	1	P	1	1	A	CE	Somersworth	22.3
Somersworth 98-539	1	P	1	1	A	CE	Somersworth	55.1
Willand Pond	2	U	3	3A	U	FO	Somersworth	12.7
City Well Parcel	3	U	3	3A	U	FO	Somersworth	24.6
Willand Pond Recreation Trail	9	P	9	9	A	ROW	Somersworth	2.3
<b>Total</b>								<b>407.3</b>

Table Key

Level of Protection

- Level 1 Permanent Conservation Land:  
Land permanently protected from development through legally enforceable conservation easement, deed restriction, or outright ownership by an organization or agency whose mission emphasizes protecting land in perpetuity; more than 50% of area will remain undeveloped
- Level 2 Unofficial Conservation Land:  
Not permanently protected through any legal mechanisms such as deed restrictions or conservation easements. Owned by a public institution, public agency, or other organization whose mission may not be focused on conservation, but whose clear intent is to keep the land for conservation, recreation, or educational purposes and in mostly natural land cover
- Level 3 Unprotected water supply land:  
Not permanently protected through any legal mechanisms such as deed restrictions or conservation easements. Land owned or controlled by suppliers of public drinking water. Includes all unprotected supplies owned by a municipality or a subdivision of a municipality, and all unprotected private water systems which serve 500 people or more.
- Level 9 Unknown

Management Status

- 1 A tract entirely protected from conversion of natural land cover and with a management plan or deed restrictions in operation to maintain land in a natural state. Natural processes and disturbance events are allowed to proceed without interference or are mimicked through management practices.
- 2 A tract entirely protected from conversion of natural land cover and with a management plan or deed restrictions in operation to maintain a primarily natural state, but which may receive uses (e.g. limited vehicular traffic, small-scale wildlife habitat management, etc.) or management practices, including suppression of natural processes and disturbances that can degrade the quality of existing natural communities.
- 3 A tract protected from conversion of natural cover for more than 50% of area, but subject to extractive uses of either a broad-scale low-moderate intensity type (such as timber harvest) or localized-scale high intensity type (e.g., mining).
- 9 Unknown

Gap Analysis Program (GAP) Status

- 1 Permanent, legal protection. Managed to maintain a natural state. No motorized recreation, natural processes are unhindered, and no extractive uses.
- 2 Permanent, legal protection. Managed to maintain a primarily natural state. Limited snowmobiling allowed, natural processes are mostly unhindered, and no widespread extractive uses.
- 3 Permanent, legal protection. Managed to maintain natural land cover, allows extractive uses of renewable resources (e.g. timber harvesting), and allows higher intensity or density of recreational uses.
- 3A No legal protection, but current ownership has institutional mandates or intention to manage for natural land cover.
- 9 Unknown

Primary Protection Type

FO	Fee Ownership
CE	Conservation Easement
ROW	Right of Way
PR	Preservation Restriction
SA	Set Aside Areas of Development

Access

A	Allowed
NA	Not Allowed
R	Restricted to Certain Areas
U	Unknown

Term of Protection

P	Perpetual
U	Unknown

# Unfragmented Land

Over 60 percent (3,855 acres) of land within Somersworth is identified as unfragmented land, or contiguous blocks of natural land cover that are not bisected by significant development, roads, or waterbodies, and may have greater habitat value for wildlife. Unfragmented land extends into Rochester and Rollinsford on the northwest and southeast sides of the City. *MAP 4: Conservation and Unfragmented Lands* displays unfragmented land classified by the size of the unfragmented area. Regional connectivity of unfragmented land is displayed in the MAP 4 inset, and highlighted in Figure 7.

Unfragmented land is ranked on a scale of 0-15 based on factors including the size of the unfragmented area and the area to perimeter ratio. Most unfragmented lands in Somersworth have a block score of two to four. The block with the highest score (seven) is located along the Somersworth-Rollinsford municipal boundary. This area is part of a 765 acre area of unfragmented land in Somersworth and Rollinsford.

With the exception of Sherwood Glen, all conservation land in Somersworth is adjacent to or located within larger areas of unfragmented land. Gerrish Common Open Space, the Former Well Parcel, and the Medical Mile Easement are located within 250-500 acre unfragmented areas. Genest and Chabot Street Conservation Easement are both located adjacent to 500-1,000 acre areas. There are no unfragmented lands greater than 1,000 acres in the city.

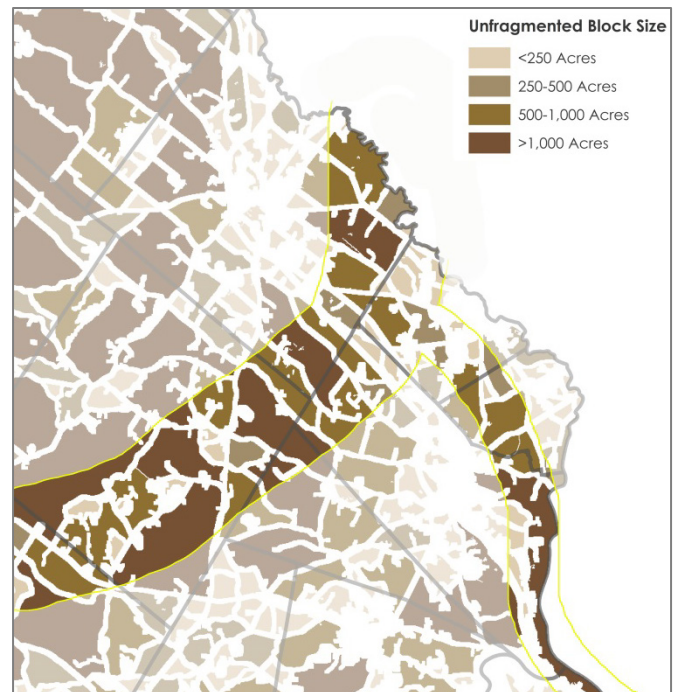
Many of the city's riparian areas and wetlands are located within unfragmented blocks (Table 5). There are approximately 1,668 acres of wetland habitat (or over 26 percent of the total land area of the city) within unfragmented blocks of land. Unfragmented land blocks also contain approximately 880 acres of agriculture, cleared, and other open or disturbed land.

**Table 5. Riparian Areas, Wetlands, and Disturbed land within Unfragmented Blocks**

	Acres within Unfragmented Blocks	Percent of Total Land Area of City
Riparian area	1,498.6	23.6
Palustrine emergent wetland	129.5	2.0
Wetlands greater than 5 acres	803.9	12.7
Small wetland clusters	49.1	0.8
Wetland habitat types	1,668.0	26.3
Agriculture	295.9	4.7
Cleared/other open or disturbed	583.7	9.2

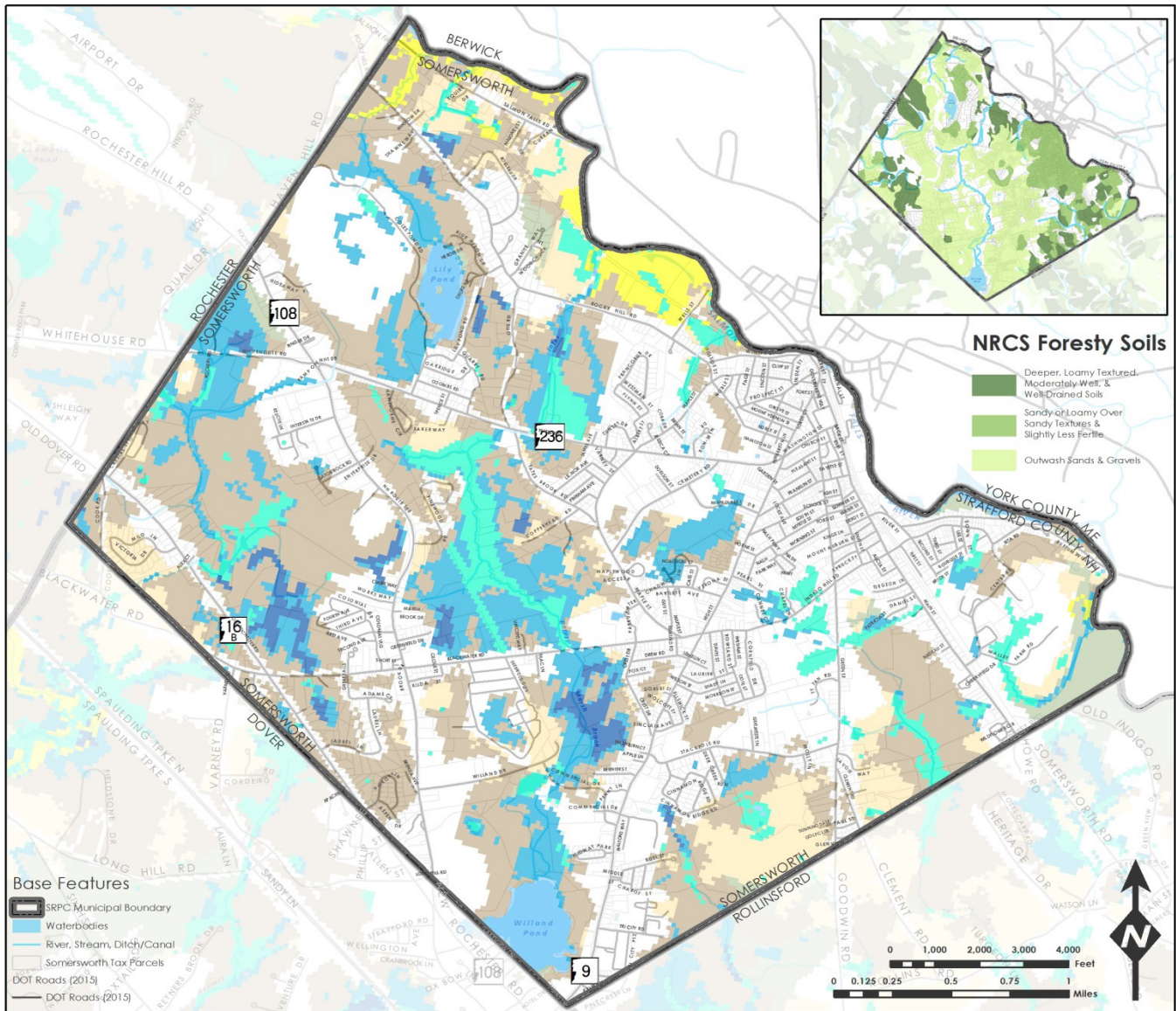
## About Unfragmented Land Data

The unfragmented land dataset was developed as part of the 2010 Wildlife Action Plan (WAP) and is based on a buffered analysis of 21 classes of land cover identified in the 2001 UNH GRANIT Land Cover Assessment Data grid (the residential/ commercial/ industrial development and transportation classes were excluded). A 300 foot buffer from NHDOT class 1-V roadways and waterbodies greater than ¼ mile in width was used to identify areas of that most organisms would not be able to circumvent. Unfragmented habitat blocks of land were ranked according to total land area and area/perimeter ration and based on species of conservation concern in New Hampshire that require unfragmented habitat mosaics.



**Figure 7. Corridors of unfragmented land can provide greater wildlife habitat than patches of unfragmented land and can meet the habitat need of species that require diverse habitat types or a larger range. Shown above are unfragmented blocks of land classified by block score, with higher score shown in darker shades. North-south and southwest-northeast corridors are highlighted.**

# 5. Wildlife Action Plan (WAP) Habitats (2015)



Map 5: Wildlife Action Plan Habitats

# Wildlife Action Plan (WAP) Habitats

## Habitats

This chapter describes habitats identified in the revised 2015 NH Wildlife Action Plan (WAP). These habitats are based on habitat types developed by the Northeast Terrestrial Habitat Classification and the Northeast Aquatic Habitat Classification. The WAP identified and assessed the wildlife habitat condition of 27 habitat types.<sup>19</sup> These habitats include different types of forest habitats; alpine, rock, and cave habitats; grass, shrub, and developed habitats; wetlands; lakes, ponds, and rivers; and coastal habitats. *MAP 5 Wildlife Action Plan Habitats* and Table 6 display the ten habitats that are found in Somersworth. A brief description of select habitats follows.

**Table 6. Habitats found in Somersworth (NH WAP)**

Habitat	Acres	Percent of Total Area of Somersworth	Percent of Total Area of Habitat in New Hampshire
Appalachian oak-pine	1,663.9	26.0	11.5
Floodplain forest	116.9	1.8	0.4
Grassland	461.2	7.2	4.3
Hemlock-hardwood-pine	112.6	1.8	34.0
NLCD Developed Classes	2,818.9	44.1	7.5
NLCD Developed Classes/Open water	7.9	0.1	0.02
Open water	127.1	2.0	4.1
Peatland	106.9	1.7	0.9
Temperate swamp	643.9	10.1	1.5
Wet meadow/shrub wetland	332.1	5.2	2.6

## Developed Habitat

Developed habitats account for over 2,800 acres (44 percent) of Somersworth.<sup>20</sup> This habitat type is characterized by gardens, lawns, and residential and commercial development. Species such as birds and bees have learned to adapt to developed areas and utilize this habitat for nesting and finding food.

## Appalachian Oak-Pine

The most commonly occurring forest type in Somersworth is Appalachian oak-pine, which accounts for 1,664 acres (26 percent) of the City. These forests are found at elevations below 900 feet in southern New Hampshire. Appalachian oak-pine forests have dry, sandy, nutrient-poor soils that are suitable for species including oak, hickory, mountain laurel, and sugar maple. The frequent fires that traditionally occur in these forest habitats result in complex structure and biodiversity. Appalachian oak-pine forests are rich in nut-bearing oaks and hickories, an important food source for wildlife.<sup>21</sup> Appalachian oak-pine forests cover approximately 12 percent of the state.<sup>22</sup> Threats to this habitat in New Hampshire include habitat conversion and degradation from development, loss of biodiversity associated with fewer beaver dams, loss of forest age diversity, and less fire.



**Appalachian oak-pine forest  
(Image credit: Ben Kimball)**

<sup>19</sup> NH Wildlife Action Plan Habitats Executive Summary. NH Fish and Game Department. (2015) <http://www.wildlife.state.nh.us/wildlife/documents/wap/executive-summary.pdf>

<sup>20</sup> NH Wildlife Action Plan Habitats Executive Summary. NH Fish and Game Department. (2015) <http://www.wildlife.state.nh.us/wildlife/documents/wap/executive-summary.pdf>

<sup>21</sup> NH Wildlife Action Plan Habitat Stewardship Series. Appalachian Oak-Pine Forests <http://www.wildlife.state.nh.us/nongame/documents/habitat-appalachian-oak.pdf>

<sup>22</sup> NH Wildlife Action Plan Habitat Stewardship Series. Appalachian Oak-Pine Forests <http://www.wildlife.state.nh.us/nongame/documents/habitat-appalachian-oak.pdf>

## Temperate Swamps

Approximately ten percent of the area of the City (644 acres) is comprised of temperate swamps. Temperate swamps are a type of forested wetland that are often found in isolated or stagnant basins with wet, nutrient rich, soils. Temperate swamps provide services and functions ranging from wildlife habitat, sediment retention, and erosion control to recreation.<sup>23</sup> Invasive species, such as the hemlock woolly adelgid, are a significant threat to this habitat. Habitat degradation and impacts to species associated with fertilizers and insecticides are also a threat to wetlands. Temperate swamps account for less than two percent of New Hampshire, of which 22 percent is protected statewide. This wetland habitat provides critical functions including flood control, pollutant filtration, and educational opportunities.<sup>24</sup>



**Temperate swamp (Image credit: Ben Kimball)**

## Grasslands

Grasslands account for 461 acres (7 percent of the land area) of various sizes are important habitats for many species. Grasslands are characterized by grasses, sedges, and wildflowers with few shrubs and trees.<sup>25</sup> Common grassland habitats in New Hampshire include agricultural fields, wet meadows, and areas associated with development, such as airports or commercial or industrial parks. Both development and natural forest succession impact grasslands.



**Grasslands  
(Image credit: UNH Cooperative Extension)**

## Peatlands

Somersworth has approximately 107 acres (1.7 percent of the land area) of peatland, a rare habitat in New Hampshire that accounts for less than one percent of the area of the state. Peatlands are a type of wetland ecosystem that is made of organic material formed by decaying wetland plants typically associated with acidic or stagnant water that is low in oxygen.<sup>26</sup> This habitat is very important on a global scale because it sequesters carbon from the atmosphere. At a regional and state scale, peatlands are an important habitat for at least 550 different plant species as well as many rare and endangered species, including the state-endangered Blanding's turtle.<sup>27</sup>



**Peatland (Image credit: Ben Kimball)**

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<sup>23</sup> NH Wildlife Action Plan Appendix B Habitats <http://www.wildlife.state.nh.us/wildlife/documents/wap/appendixb-habitats.pdf>

<sup>24</sup> NH Wildlife Action Plan Appendix B Habitats <http://www.wildlife.state.nh.us/wildlife/documents/wap/appendixb-habitats.pdf>

<sup>25</sup> NH Wildlife Action Plan Habitat Types and Species <http://www.wildlife.state.nh.us/habitat/types.html>

<sup>26</sup> <http://www.wildlife.state.nh.us/nongame/documents/habitat-peatlands.pdf>

<sup>27</sup> <http://www.wildlife.state.nh.us/nongame/documents/habitat-peatlands.pdf>

## NRCS Forestry Soils

Forest soil groups are map units that have a similar potential for commercial forest products; suitability for native tree growth; and use and management based on factors including depth to bedrock, texture, saturated hydraulic conductivity, available water capacity, drainage class, and slope. These groups were developed to assist land users and managers with evaluating the relative productivity of soils, understanding plant succession, and making land use decisions.<sup>28</sup>

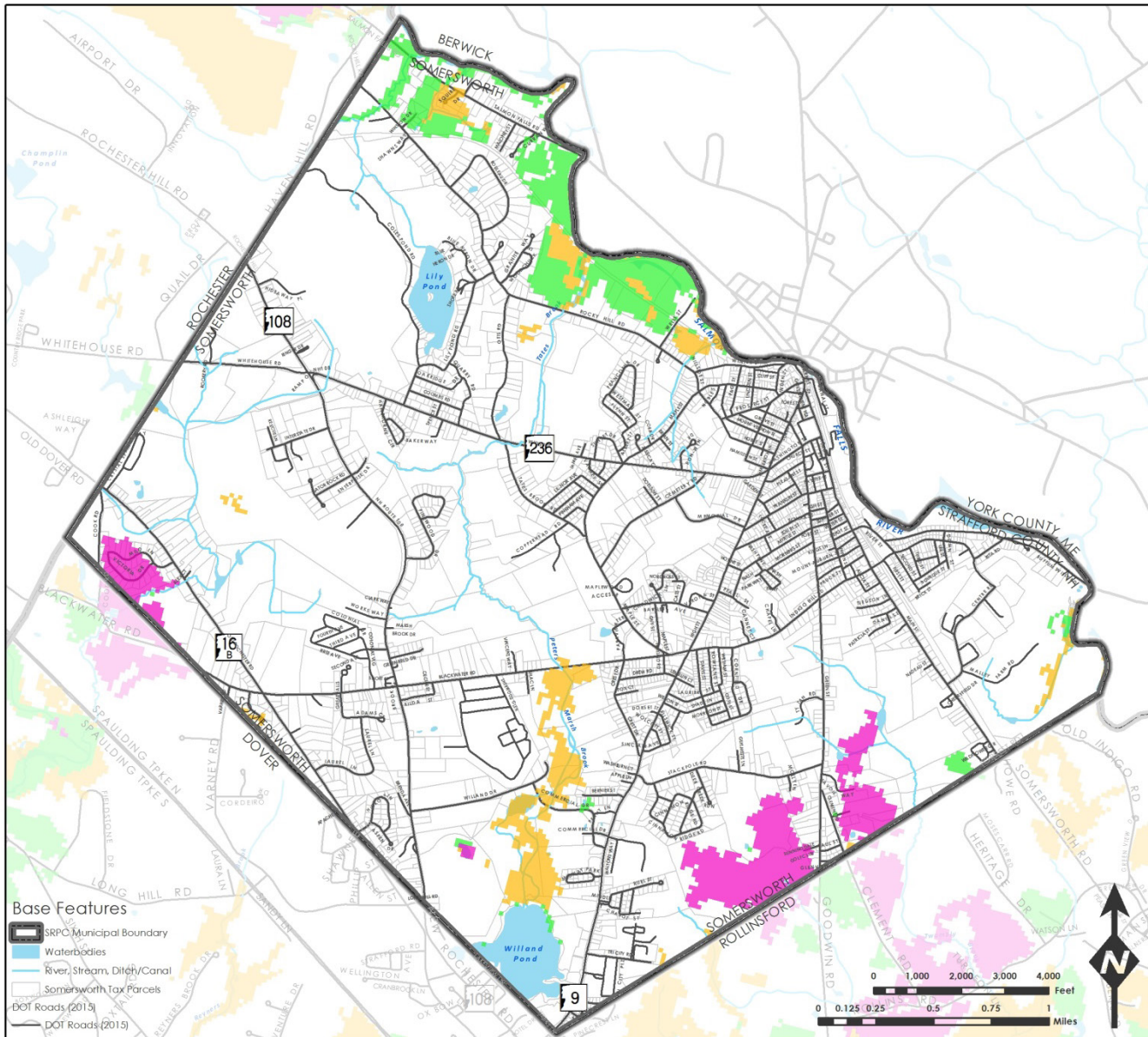
Table 7 displays the acreage of each soil group in Somersworth. The most prevalent forest soil group is IC, accounting for nearly 40 percent of soils in the City. In Strafford County, IC soils consist of outwash sands and gravels that are moderately and excessively drained. Because they are coarse textured, somewhat droughty and less fertile than IA and IB soil groups, forest succession tends to include shade tolerant softwoods, and there is low to moderate hardwood competition. Soils in the IC soil group are especially suited for white pine forest management. Approximately 11 percent of soils have not been classified by soil group because they are either so variable or have a limited potential for commercial production of forest products.

**Table 7. Forestry soils in Somersworth (Source: NRCS)**

Soil Group	Description	Acres	Percent of Total Area of Somersworth
IA	Deeper, loamy textured, moderately well- and well-drained soils, generally more fertile	789.4	12.4
IB	Sandy or loamy over sandy textures and slightly less fertile	1101.2	17.2
IC	Outwash Sands and gravel	2449.7	38.4
IIA	Many of the same soils as in groups IA and IB, separated because they have physical limitations that make forest management more difficult and costly	288.9	4.5
IIB	Poorly drained, generally less productive, with a seasonal high water table that is generally within 12 inches of the surface	1077.5	16.9
NC	Not classified	678.6	10.6

<sup>28</sup> New Hampshire Soil Data Dictionary. USDA Natural Resources Conservation Services. Revised March 18, 2013.

# 6. Wildlife Action Plan (WAP) Tiers



### Map Features

- 1 - Highest Ranked Habitat in New Hampshire
- 2 - Highest Ranked Habitat in Biological Region
- 3 - Supporting Landscapes

### Map Feature Notes

Highest Ranked in the State habitats include the top 15% by area of each habitat with a few exceptions. Especially rare habitats (alpine, dunes, saltmarshes, rocky shores) were included 100% to emphasize their importance. To ensure that the known critical habitats of state-listed species were included, we added that information as well.

Highest Ranked in the Biological Region compares the habitats within regions of the state that have similar climate, geology and other factors that influence biology. As you drive south to north in the state, you can see how different the landscape looks, so comparing the North Country to the southeast is not quite balanced. Within each biological region (calculated separately for terrestrial versus wet habitats) the top 30% of each habitat is included, except that that area already within the Highest Ranked in the State is kept as top ranked, with the rest added as Highest Ranked in the Biological Region. Some high priority natural communities as ranked by NH Natural Heritage Bureau were added to highlight the importance of plant diversity in habitat quality.

Supporting landscapes includes the remainder of the top 50% of each habitat plus some very large intact forest blocks that were not otherwise top ranked.

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**Map 6: Wildlife Action Plan Tiers**



# Wildlife Action Plan Tiers

## Tiers

MAP 6: *Wildlife Action Plan Tiers* displays the highest ranked wildlife habitat by ecological condition relative habitat statewide. Three tiers are recognized in the WAP:

- Tier 1: Highest Ranked Habitat in New Hampshire
- Tier 2: Highest Ranked Habitat in Biological Region
- Tier 3: Supporting Landscapes.<sup>29</sup>

This data can be used at the local level to better understand where the areas of greatest ecological value are located and to help determine actions to protect and preserve those habitats. Within Somersworth there are a total of 544 acres of Tier 1, 2, and 3 habitats (Table 8).

Tier 1 habitat accounts for less than three percent of the total area of the City. This highest ranked habitat in New Hampshire is comprised of approximately 180 acres of grassland habitat located in three areas of the City: off Old Rochester Road surrounding Milo Lane and Victoria Drive in the west corner of the City; between High Street and Goodwin Road; and just east of Clement Road adjacent to Rollinsford.

Tier 2 habitat represents the highest ranked habitat in the biological region. There are approximately 200 acres of Tier 2 habitat in the northwest corner of the City adjacent to the Salmon Falls River. The habitat in this area includes floodplain forest, grassland, and wet meadow.

There are approximately 162 acres of Tier 3 habitat, or supporting landscapes, located in patches east of Rocky Hill Road and along Peters Marsh Brook. Supporting landscape habitats in Somersworth include wet meadow and temperate swamp.

## Wildlife Action Plan Ranking

The Highest Ranked Wildlife Habitat map shows where habitat exists in the best ecological condition based on:

- Biodiversity of plant and animals
- Information on the spatial arrangement of patches of different habitat types
- The impacts of human activities on habitats, such as the effects of development, roads, utility corridors, pollutants, and direct habitat alteration that change the type of habitat

The Surface Water Analysis Includes:

- High quality streams and rivers based on attributes including the length of the functional stream network, low riparian development and agriculture, no dams and upstream dam water storage less than 10% of mean annual flow, low impervious surfaces (less than 2%) in the watershed.
- Lakes and ponds based on natural land cover, absence of dams, distance to nearest road or trail within 200 meters of the shoreline; intactness of the natural cover of the watershed; an index of ecological integrity; and size of the water body.

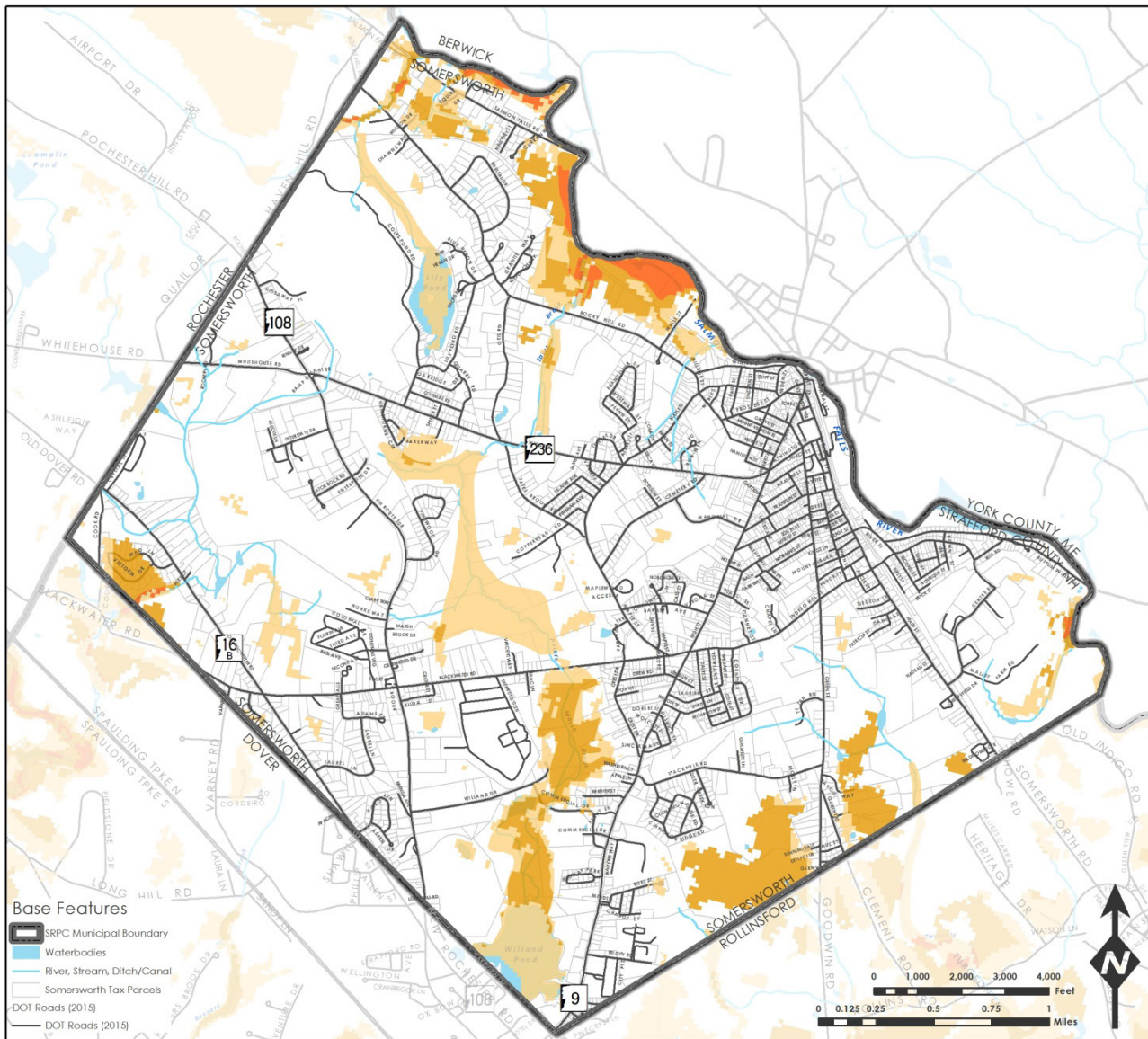
For more information and online maps visit:  
<http://www.wildlife.state.nh.us/wildlife/wap.html>  
 (Source: New Hampshire Fish and Game)

**Table 8. Acreage of WAP Habitat in Somersworth (Source: NH Fish and Game)**

Habitat Tier	Acres	Percent of Total Area in Somersworth	Percent of Total Area of New Hampshire that Tier Accounts for
1	181.6	2.8	23.2
2	200.7	3.1	17.5
3	161.7	2.5	25.9
Total Habitat Tiers	544.0	8.5	66.6
Total Acres in Somersworth	6398.3		

<sup>29</sup> NH Wildlife Action Plan Habitats Executive Summary. NH Fish and Game Department. (2015) <http://www.wildlife.state.nh.us/wildlife/documents/wap/executive-summary.pdf>

# 7. Natural Resource Co-Occurrence



## Feature Co-Occurrence

(100-Year Floodplain, Selected WAP Habitats, Unfragmented Lands, WAP Tiers 1-3)

- Four (4) Feature Co-Occurrence
- Three (3) Feature Co-Occurrence
- Two (2) Feature Co-Occurrence

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### Data Sources

Base features are from USGS 1:24,000 scale Digital Line Graphs, as archived in the GRANIT database. Digital data in NH GRANIT represent the efforts of the contributing agencies to record information from the cited source materials. Complex Systems Research Center (CSRC), under contract to the Office of Energy & Planning (OEP), and in consultation with cooperating agencies, maintains a continuing program to identify and correct errors in these data.

Neither OEP nor CSRC make any claim as to the validity or reliability or to any implied uses of these data.

Digital tax parcels taken from SRPC database. Data should be used for planning purposes only. Data was derived from various sources and were updated at different timeframes, with varying levels of accuracy.

Street names are maintained internally by SRPC staff. Please notify SRPC of any missing or inaccurate street names.

**Map 7: Natural Resource Co-Occurrence**

# Natural Resource Co-Occurrence

## Feature Co-Occurrence

One method to determine priority areas for conservation and protection is to identify the areas of the City where multiple significant natural resources are present. *MAP 7: Feature Co-Occurrence* displays a GIS analysis of the co-occurrence, or overlap, of select natural resources and features. These include WAP Tier 1, 2, or 3; WAP grassland, peatland, floodplain forest habitat; unfragmented lands, and 100 year floodplains (see box, right). The greatest level of co-occurrence (score of four) is displayed in orange-red. The inputs for this analysis were identified by the Conservation Commission and City staff with SRPC (see box, right).

The total acreage of the areas where two, three, and four select natural resources co-occur is displayed in Table 9. The areas where two of the select natural resources overlap account for a majority (55.6 percent) of the feature co-occurrence area and 8.5 percent of the total area of Somersworth. Less than one percent of the area of the City had a co-occurrence score of four.

**Features Included in the Co-Occurrence Map**

1 point for any Wildlife Action Plan Tier:

- Tier 1: Highest Ranked Habitat in New Hampshire
- Tier 2: Highest Ranked Habitat in Biological Region
- Tier 3: Supporting Landscapes

1 point for any priority Wildlife Action Plan Habitat:

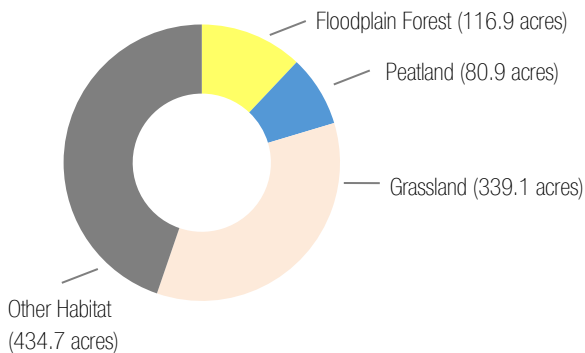
- Grassland
- Peatland
- Floodplain Forest

1 point if land is in an Unfragmented Lands Block

1 point if in the 100 Year Floodplain

## Habitat Co-Occurrence with Other Features

Grassland habitat accounts for approximately one-third (339.1 acres) of the total habitat within areas of feature co-occurrence (Figure 8). Floodplain forest and peatland account for approximately twelve and eight percent, respectively. All areas of floodplain forest within the City fall within the feature co-occurrence layer, meaning that where floodplain forest habitat occurs, one or more of the additional select natural resources identified in the box above also occur. Approximately 75 percent of the total area of peatland and grassland habitat within the City falls within the feature co-occurrence layer.



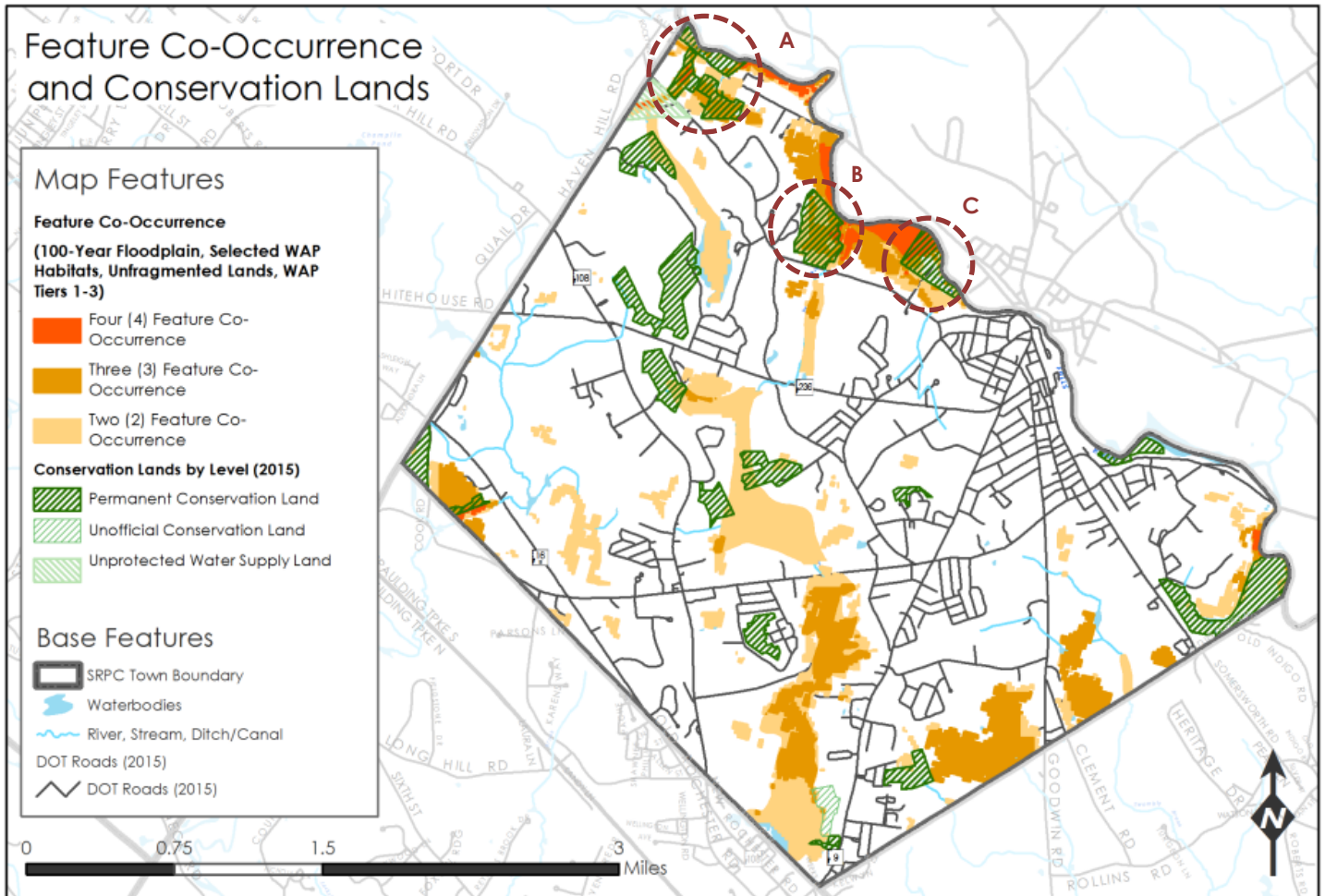
**Figure 8. Acres of habitat within areas of feature co-occurrence**

**Table 9. Acreage of Feature Co-Occurrence**

Number of Feature Co-Occurrence	Acres	Percent of Co-Occurrence Area	Percent of Total Area in Somersworth
2	540.5	55.6	8.5
3	377.5	38.9	5.9
4	53.6	5.5	0.8
Total	971.6		15.3

## Feature Co-Occurrence and Existing Conservation Land

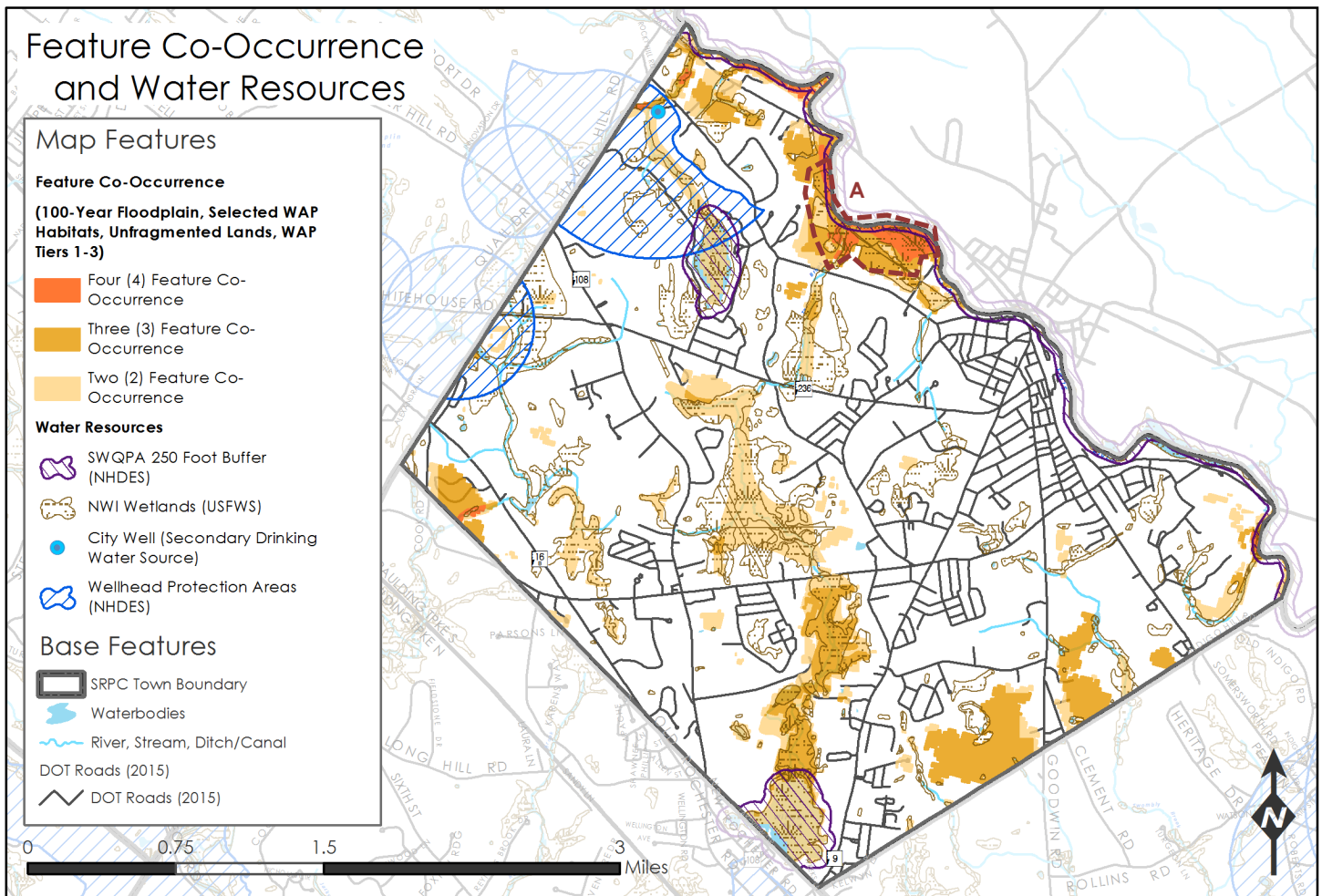
Map 8 displays the feature co-occurrence layer with the existing conservation land in Somersworth. This map shows the proximity of existing conservation land to other lands where two or more significant natural resources are present. This information is useful for identifying opportunities to increase connectivity and patch size of conserved land. Map 8 also reveals areas of Somersworth, including the northern part of the City along the Salmon Falls River (see A-C, Map 8), where significant natural resources that were included in the co-occurrence map are already protected by permanent conservation land. It also shows that much of the existing conservation land does not overlap with the select natural resources included in the co-occurrence analysis due to the presence of habitats other than floodplain forest, grassland, or peatland and/or other factors.



**Map 8. Feature co-occurrence and conservation lands**

## Feature Co-Occurrence and Water Resources

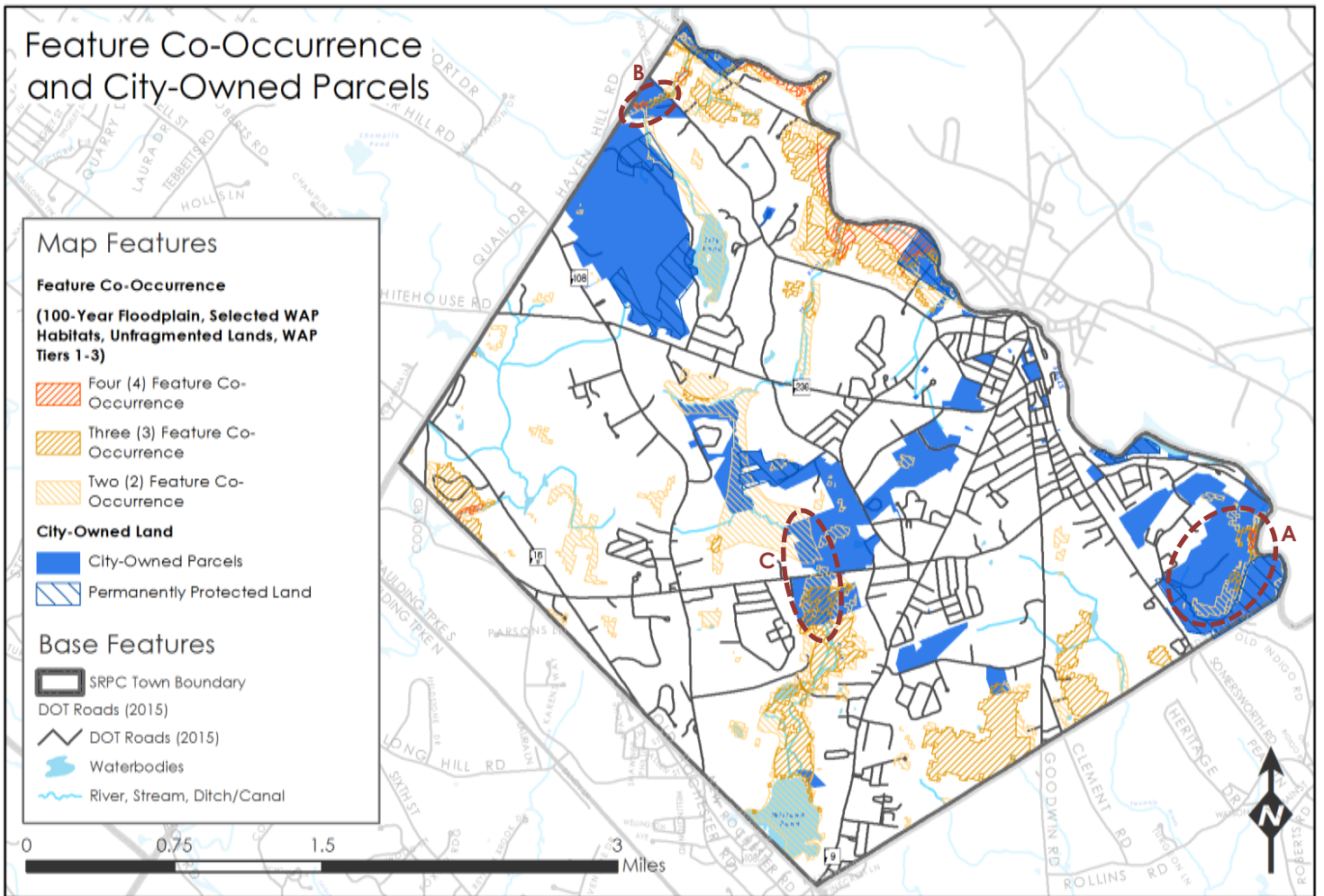
Map 9, which displays the feature co-occurrence and water resources— including a 250 foot water resource protection buffer, wetlands, and the wellhead protection area for the City’s well — was created to further inform conservation priorities. This map highlights additional lands where multiple natural resources and protected areas are present. Many of the areas with the greatest concentration of natural resources are located along the Salmon Falls River in the northern part of the City. Many of these areas are already protected from development, to a degree, due to the presence of wetlands and proximity to the shoreland (see A, Map 9).



**Map 9. Feature co-occurrence and water resources**

## Feature Co-Occurrence and City-Owned Land

City-owned property accounts for approximately 14% or 910 acres of the City. Roughly 23% of City-owned land is conserved. Map 10 displays feature co-occurrence with parcels that are owned by the City of Somersworth along with permanently protected, City-owned conservation land. In the east corner of the City, there are areas of City-owned land adjacent to City-owned conservation land where multiple natural resources co-occur (see A, Map 10). Other areas of City-owned land that are not protected and contain multiple natural priority resources include a stretch of land in the City Well Parcel (see B, Map 10) and land to the north and south of Blackwater Road along Peters Marsh Brook (see C, Map 10). The City may wish to investigate the potential to permanently conserve and/or review management of natural resources in these areas.



**Map 10. Feature co-occurrence and City-owned parcels**

## Feature Co-Occurrence and Build Out

A basic, zoning-based build out analysis was conducted in order to identify areas of the City where development could occur in the future. Data included in this analysis is shown in the box to the right. Local setbacks, buffers, and other development restrictions were not included in this analysis.

There are approximately 1,835 acres of developable land within the City (Map 11). With the exception of the City's downtown, where there are limited opportunities for new development of undeveloped land, small blocks of developable land are scattered throughout the City. The large areas of unconstrained land are located in the west corner of the City, northwest of Willand Pond, and to the east of Malley Farm. An additional 142 acres of land were identified with select partial development constraints (see box, right).

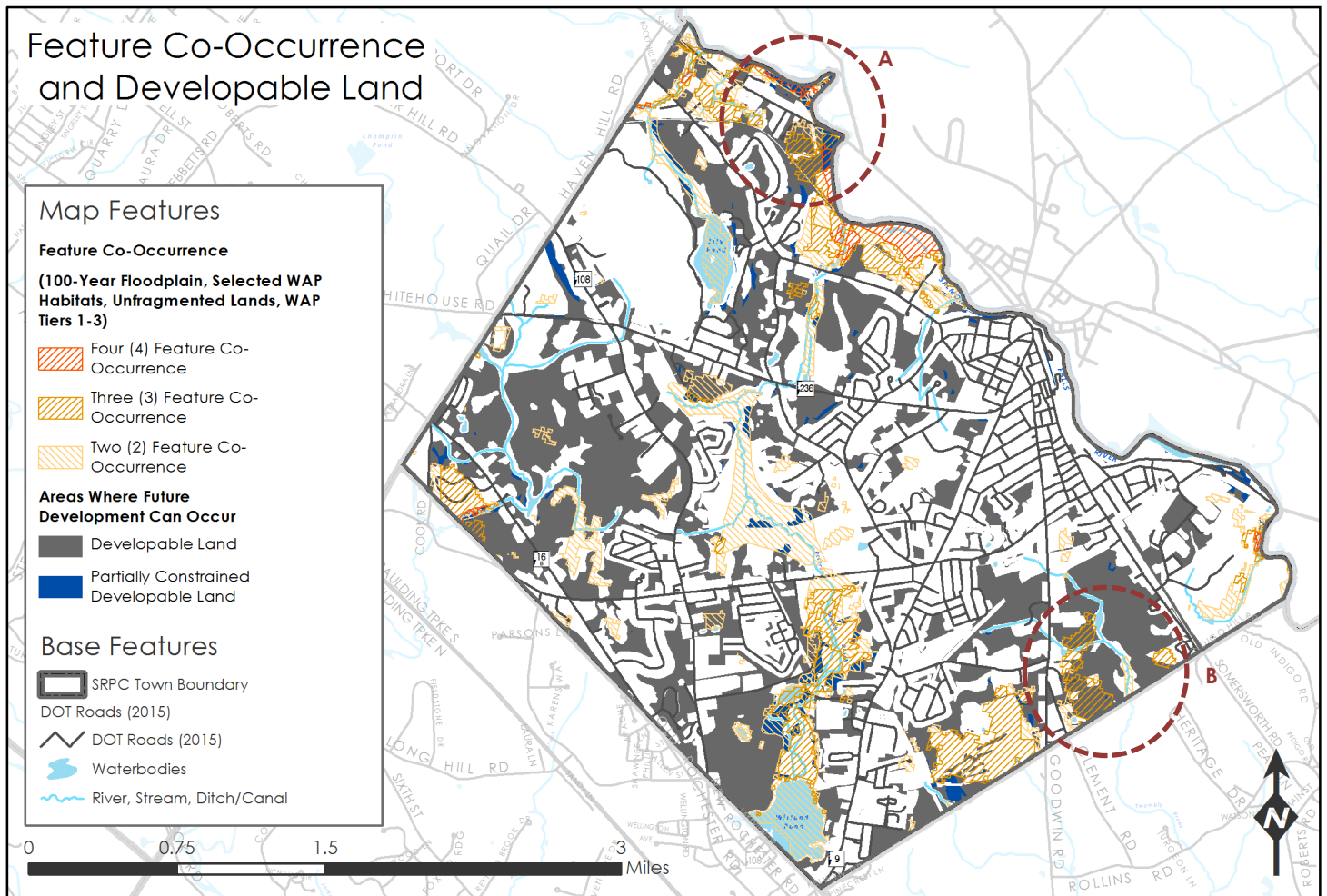
Developable land was overlain with the feature co-occurrence layer to identify areas where future development and land conservation may be in conflict. Two of these areas include land adjacent to the Salmon Falls River in the norther part of the City (see A, Map 11) and land between Green Street and Main Street adjacent to Rollinsford (see B, Map 11).

### Developable land excludes:

- Permanently protected conservation land
- Already developed land
- City-owned land
- Land within the 50 foot Surface Water Quality Protection Act (SWQPA) buffer
- Steep slopes >25%
- National Wetlands Inventory (NWI) wetlands

### Partially constrained developable land includes:

- Land within the 250 foot SWQPA buffer
- Steep slopes between 15-25%
- Land within the 100-year floodplain



Map 11. Feature co-occurrence and developable land

## Areas of Conservation Interest

Through the co-occurrence modeling and analysis, eight areas of the City emerged as potential priority conservation areas. Prior to developing a land conservation strategy, additional research, field investigations, discussions with land owners, and opportunity for public input should supplement this baseline analysis.

The following areas are potential priority conservation areas identified on Map 12:

**A**

Wetlands, floodplain forest, Tier 2 and 3 WAP habitat, and portions of the protected shoreland co-occur within a roughly 30 acre area adjacent to the Salmon Falls River. This area is located within a nearly 140 acre block of unfragmented land. It is adjacent to and partially includes two conservation lands (Parsons Park and Day-Agricultural Pres. Rest.). Because portions of this area are also within the 100-year floodplain, it may be less suited for development, and, in a natural state, provides flood storage capacity.

**B**

A large patch of unfragmented land greater than 760 acres straddles the Somersworth–Rollinsford border. This area is adjacent to existing conservation land (Genest and Chabot Street Conservation Easement). The diverse grassland, Appalachian oak-pine, and wet meadow habitat in this area indicate the presence of edge habitat between these habitats. Swaths of farmland of local importance as well as IA (Deeper, loamy textured, moderately well- and well-drained soils, generally more fertile), IB (Sandy or loamy over sandy textures and slightly less fertile), and IC (Outwash Sands and gravel) forestry soils also co-occur with the feature natural resources in this area of the City. The habitat in this part of the City is classified as WAP Tier 1 habitat.

**C**

Within the Peters Marsh Brook floodplain, blocks of unfragmented land, temperate swamp, and some peatland are present. This diverse wetlands complex provides suitable habitat for a variety of species. This area is part of a larger corridor, which is highlighted with a dotted line, in Map 12. Habitat here is classified as WAP Tier 3 habitat.

**D**

The north corner of the City is among the highest co-occurrence scoring regions of Somersworth. This land is located along the Salmon Falls River, adjacent to the Salmon Falls Woods conservation land, and in close proximity to the Salmon Falls Woods 2 and Cameron Farms conservation lands. It is also an area with floodplain forest, a priority habitat identified by the Conservation Commission during this analysis. Habitat in this area of the City is classified as Tier 2 habitat. Land within this area of the City is unconstrained with regard to development potential based on the build-out analysis conducted as part of this NRA

**E**

Agricultural land located just north of the Day- Agricultural Pres. Rest. and adjacent to the Salmon Falls River represents some of the largest contiguous agricultural land in the City. This area is part of a nearly 140 acre block of unfragmented land. This land is characterized by farmland soils of local importance with some fertile, deeper, loamy textured, moderately well- and well-drained forestry soils, as well as outwash sands and gravel.

**F**

The City's well parcel, located in the northern part of the City on the Somersworth-Rochester border, is classified as unprotected water supply land. This 23.9 acre parcel is owned by the City and located within the City's wellhead protection area. It is also located between two existing permanently conserved properties, Salmon Falls Woods 2 and Somersworth 98-539. A strip of this parcel is classified as Tier 2 WAP habitat.

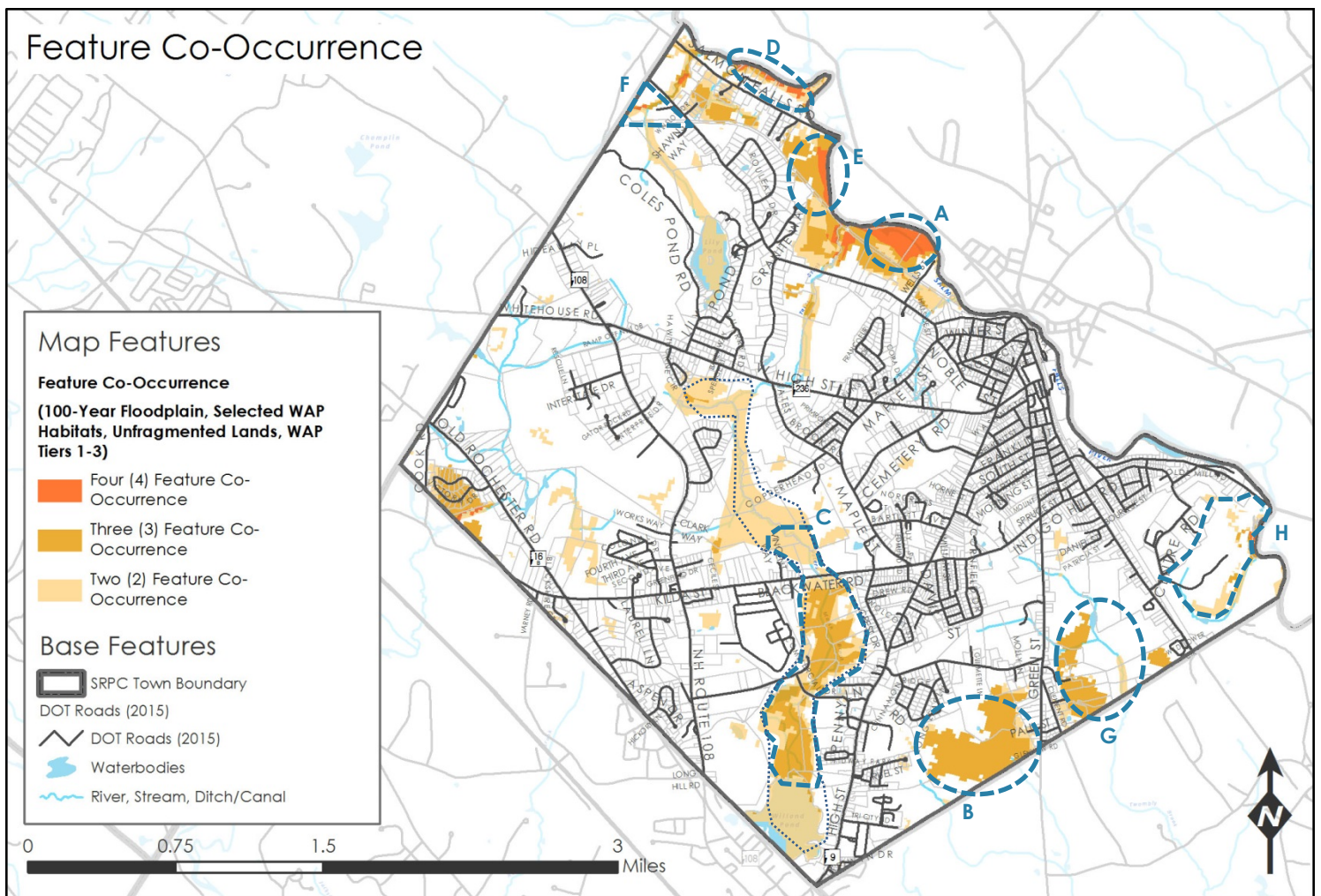


G

Concentrations of agricultural activity in Somersworth are located between Green Street and Main Street along near the Somersworth-Rollinsford boarder. This land is part of an unfragmented block of land over 400 acres in size that extends into Rollinsford. Twombly Brook and its floodplain run through this area of the City. Grassland habitat, as well as wet meadow/shrub wetland and Appalachian oak-pine are present. Portions of this area are classified as WAP Tier 1 habitat. Many of the properties in this area of the City are in Current Use, indicating landowner intention to leave land undeveloped. However, the build-out analysis indicates that development is unconstrained in this area.

H

There is significant habitat and some topographical diversity within a small geographic area of City-owned land adjacent to Malley Farm and the Salmon Falls River. Habitats in this area include floodplain forest, hemlock-hardwood-pine, temperate swamp, grassland, and wet meadow/shrub wetland. Portions of the habitat in this area are classified as WAP Tier 2 and 3 habitat. This area has some slopes of 15-25%.



Map 12. Feature co-occurrence with areas of conservation interest

# IV) Recommendations

While this assessment is not a comprehensive natural resources inventory or a conservation action plan, it provides general and map-based recommendations to help guide future data collection, conservation, and natural resource management in Somersworth. The recommendations provided in this chapter are not intended to be parcel-level recommendations, but to highlight potential land conservation priorities. In addition to outlining priorities for three targeted habitats, landscape level considerations, this chapter also provides recommended outreach and education strategies, future steps for inventory and management of natural resources, and regulatory considerations.

## Land Conservation Priority Areas and Habitats

### Landscape Level Considerations

1. Review potential priority areas A-H identified on Map 12 to determine additional research needs and refine boundary of targeted areas.
2. Preserve large and contiguous blocks of natural, undisturbed vegetation and connect with undeveloped lands on adjacent parcels.
3. Determine which wildlife species the City desires to plan habitat corridors or strips of protected land for and prepare a site-specific wildlife assessment to identify corridors with sufficient width to provide adequate cover through a property or a section of the City.<sup>30</sup>
4. Establish large conservation areas by locating conservation land close to other patches of conservation land and natural areas.
5. Increase flood-storage capacity by maintaining wetlands and floodplains by preserving in an undeveloped, natural state in areas A, C, D, and E on Map 12.
6. Consider conserving areas within the wellhead protection area, including area F on Map 12, and any potential public drinking water supply lands in order to protect water resources.
7. Where possible, establish protective buffers between development and Tier 1, 2, and 3 WAP habitat lands.

### Habitat Management

1. Utilize management resources available from Taking Action for Wildlife (<http://takingactionforwildlife.org/>) for managing grasslands in areas B, G, and H on Map 12:
  - a. Fields with frequent mowing: <http://takingactionforwildlife.org/content/fields-frequent-mowing>
  - b. Fields mowed once per year: <http://takingactionforwildlife.org/content/fields-mowed-once-year>
  - c. Fields mowed less than once per year: <http://takingactionforwildlife.org/content/fields-mowed-less-once-year>
  - d. Establishing wildflower meadows and pollinator habitat: <http://takingactionforwildlife.org/content/fields-mowed-less-once-year>
  - e. Managing small grasslands for birds: <http://www.massaudubon.org/our-conservation-work/wildlife-research-conservation/grassland-bird-program/grassland-birds-manual/small-grasslands>
2. Identify potential threats to floodplain forests in areas A and D, including development, dams, invasive plants, and drought and flooding associated with climate change. Consider monitoring habitat, limiting recreational trails, and preserve and protect areas of suitable slope adjacent to existing floodplains to allow for habitat expansion.<sup>31</sup>
3. Conserve biologically rich peatlands in area C of Map 12 to protect them from the impacts of development including increased stormwater runoff that can impact changes in water flow. Establish a 300 foot protective buffer of upland, undisturbed land to protect peatland water resources and habitat.<sup>32</sup>

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<sup>30</sup> Refer to NHDES's Habitat-Sensitive Site Design and Development Practices to Minimize the Impact of Development on Wildlife for more information (<http://des.nh.gov/organization/commissioner/pip/factsheets/co/documents/id-4.pdf>)

<sup>31</sup> Refer to UNH Cooperative Extension's Floodplain Habitats Climate Assessment for more information ([http://extension.unh.edu/resources/files/Resource004598\\_Rep6562.pdf](http://extension.unh.edu/resources/files/Resource004598_Rep6562.pdf))

<sup>32</sup> Refer to UNH Cooperative Extension's Peatland habitat description for more information (<http://extension.unh.edu/Peatlands>)

“For towns and land trusts, considering your whole geographic area prior to making decisions on everything from land protection to land management to zoning or regulatory changes is critical. Wildlife habitat can enhance the character of a town, provide protection from flooding, protect water resources, and provide educational opportunities for schoolchildren. Considering where the best habitat for those things are located in your town, so that both economic development and natural resources protection occur in the right places, is critical to the long-term quality of life in your town.” - New Hampshire Fish and Game

## General Recommendations

### Outreach and Education

1. Host educational natural areas walks and events to engage and inform the public.
2. Host a BioBlitz or similar rapid data collection activity to build public awareness of natural resources, engage citizen scientists, and collect local data.
3. Conduct public outreach and education of best management practices for stormwater management for property owners.
4. Seek to draw strong connections between natural resources and quality of life as well as the economic value of natural resources when promoting protection and preservation.
5. Work with garden clubs and volunteers to provide residents with information about backyard habitats and showcase gardens with tours.
6. Compile and distribute existing information about habitat conservation and water quality protection from the state, UNH Cooperative Extension, and other organizations at local events.
7. Invite a representative from a local land trust or conservation organization to speak at a televised public meeting about land conservation and protection.
8. Encourage residents to contact the UNH Cooperative Extension County Forester or Wildlife Specialist to discuss habitat management and opportunities for financial assistance for management activities.
9. Promote certification programs such as the National Wildlife Federation's Garden for Wildlife program (<http://www.nwf.org/Garden-For-Wildlife.aspx>) and the Sustainable SITES Initiative (<http://www.sustainablesites.org/> and <https://www.wildflower.org/sites/>), and recognize local achievements.
10. Foster awareness of the global impacts of local actions and increased awareness of environmental responsibility.

### Natural Resources Inventory and Management (Non-Regulatory Strategies)

1. Develop a work plan for the Conservation Commission and volunteers to conduct targeted field work to verify accuracy of regional habitat datasets and supplement the baseline data that was compiled for this Assessment.
2. As conservation land is acquired, track and compile information and work with SRPC to submit to UNH GRANIT to be included in the annual statewide Conservation Lands dataset update.
3. Compile existing NHDES water quality data for HUC 12 watersheds to better understand potential sources of contamination and threats to water quality.
4. Review and survey, as necessary, conservation lands for which the accuracy of parcel data in the UNH GRANIT Conservation Lands Layer is considered fair, including the former well parcel, Malley Pond, and Willard Pond (see appendix for complete list).
5. Identify potential hazards to surface water and groundwater through mapping and monitoring.
6. Provide the Planning Board with recommendations for integrating goals, findings, and recommendations of the Natural Resource Assessment into future Master Plan Chapters.
7. Integrate recommendations for floodplain management into future updates of the City's Multi-Hazard Mitigation Plan.

8. Collaborate with conservation partners and stakeholders (NHDES, SELT, UNH Cooperative Extension, Salmon Falls Watershed Collaborative, etc.) and adjacent communities to identify opportunities to promote regional conservation and collaborate on large conservation projects and determine species of regional concern to protect.
9. Evaluate the need to undertake an in-depth natural resources inventory.
10. Utilize findings from this Natural Resources Assessment and other research, data collection, and public input sessions to develop a long range conservation plan.
11. Complete an updated Natural Resources Assessment or Inventory in 5-10 years.
12. Support increased funding for conservation measures.

## Regulatory Strategies

1. Review existing regulations and identify opportunities to integrate habitat-sensitive site design and development practices into existing and future land use regulations to mitigate negative impacts to wildlife during and after construction through buffers, stormwater management, adequately sized culverts, native landscaping, and minimization of soil compaction and removal.<sup>33</sup>
2. Refer to voluntary guidelines for developers, design principles, and standards that can be incorporated into site plan and subdivision ordinances as performance standards that are recommended in the *Innovative Land Use Planning Techniques Handbook*<sup>34</sup> to protect habitat including:
  - a. Environmental Characteristics Zoning (RSA 674:21)
  - b. Model ordinance language for subdivision and site plan review regulations (see Appendix)
  - c. Include language in the master plan purpose and goals statements to guide the creation of ordinances and regulations to carry out the purposes of wildlife protection.
  - d. Review existing regulations for wildlife habitat protection and consider adopting an overlay zone to protect high quality wildlife habitat or a forest management district to promote protection of floodplain forests.
3. Consider using tools like conservation subdivisions and density transfer credits to ensure habitat sensitive design to reduce habitat loss, fragmentation, impacts of roads, and effects of impervious cover on aquatic habitat.<sup>35</sup>
4. Consider adopting an overlay zone to protect high quality wildlife habitat.
5. Consider adopting a forest management district to promote the protection of floodplain forests.<sup>36</sup>
6. Establish standards for green infrastructure and tree canopy cover to reduce impervious cover associated with development and to improve water filtration and infiltration, reduce the urban heat island effect, and provide wildlife habitat.

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*Revisit the land use regulations to determine if there are changes that can ensure more opportunity for:*

- *Compact, pedestrian oriented development, such Open Space Development*
- *Mixed use development*
- *Agricultural activity*
- *Low Impact Development*
- *Natural resource protection*
- *Revisions to the zoning districts and zoning standards in the downtown core*
- *Consideration of design guidelines for the downtown.*

*-Somersworth Master Plan Vision 2020*

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<sup>33</sup> For more information, refer to NHDES's Habitat Sensitive Site Design and Development Practices to Minimize the Impact of Development on Wildlife Factsheet <http://des.nh.gov/organization/commissioner/pip/factsheets/co/documents/id-4.pdf>

<sup>34</sup> Innovative Land Use Planning Techniques, A Handbook for Sustainable Development. NHDES. 2008. <https://www.nh.gov/oep/resource-library/planning/documents/innovative-land-use-planning-techniques-2008.pdf>

<sup>35</sup> For more information, refer to NHDES's Habitat Sensitive Site Design and Development Practices to Minimize the Impact of Development on Wildlife Factsheet <http://des.nh.gov/organization/commissioner/pip/factsheets/co/documents/id-4.pdf>

<sup>36</sup> For more information, refer to UNH Cooperative Extension and NH Fish and Game's *Taking Action for Wildlife* website <http://takingactionforwildlife.org/communities/using-regulation/resources-updating-regulations>

# APPENDIX

- A. UNH GRANIT Conservation Lands – Status of Mapping Table
- B. UNH GRANIT Conservation Lands Tracksheet, Data Standards, and Submission Information
- C. Rare Plants, Wildlife, and Natural Communities by Town
- D. Innovative Land Use Handbook – Site Plan Review and Subdivision Regulations Model Language and Guidance for Habitat Sensitive Site Design and Development Practices

## A. UNH GRANIT Conservation Lands – Status of Mapping Table

NAME	Accuracy of parcel boundary mapping
Sherwood Glen	1
Perry Conservation Easement - A36-1	1
Frazer	1
Perry Conservation Easement - A36-1J	1
Cameron Farms	1
Cotton Wood Subdivision Open Space	1
Genest and Chabot St Conservation Easement	1
Gerrish Common Open Space	1
Lenox Park Open Space	1
Medical Mile Conservation Easement	1
City Well Parcel	2
Buffumsville Parcel	2
Day - Agric. Pres. Rest.	2
Parsons Park	2
Gagne Easement	2
Somersworth98-539	2
Browne II Easement	2
Willand Pond	2
Frazer Land	2
Mobil Oil Conservation Easement	2
Salmon Falls Woods	2
Salmon Falls Woods 2	2
Willand Pond Recreation Trail	2
Former Well Parcel	3
Malley Farm	3
Willand Pond	3

### Key

1	Very good. Mapped from a survey which aligned well with existing information.
2	Good. Mapped from a good quality tax map or from a survey which did not completely align with existing information.
3	Fair. Mapped from poor tax map, survey, or other source. Some lines are questionable.
4	Poor. Mapped from a source which had obvious problems with spatial accuracy. Location and/or configuration are approximate only.
5	Unknown location and configuration. General area may be known. (Used only for saltmarsh lots.)

## **B. UNH GRANIT Conservation Lands Tracksheet, Data Standards, and Submission Information**

Available through the following links:

<http://www.granit.unh.edu/resourcelibrary/GRANITresources/standards/TractDataSheet.pdf>

<http://www.granit.unh.edu/resourcelibrary/GRANITresources/standards/TractDataSheetInstructions.pdf>

<http://www.granit.unh.edu/resourcelibrary/GRANITresources/standards/DigitalSubmissionInstructions.pdf>

## C. Rare Plants, Wildlife, and Natural Communities by Town

NH Natural Heritage Bureau



Town	Flag	Species or Community Name	Listed?		# reported last 20 yrs	
			Federal	State	Town	State
<b>Somersworth</b>						
<b>Natural Communities - Palustrine</b>						
	**	Sand plain basin marsh system	--	--	1	17
	***	Sandy pond shore system	--	--	1	12
<b>Plants</b>						
		greater fringed-gentian ( <i>Gentianopsis crinita</i> )	--	T	Historical	28
		lopsided rush ( <i>Juncus secundus</i> )	--	E	Historical	6
		northern beggar-ticks ( <i>Bidens hyperborea</i> )	--	E	Historical	1
	**	Northern Blazing Star ( <i>Liatris novae-angliae</i> )	--	E	1	16
	**	unpretentious yellow-seeded false pimpernel ( <i>Lindernia dubia</i> var. <i>anagallidea</i> )	--	E	1	4

**Listed?** E = Endangered T = Threatened SC = Special concern

**Flags** \*\*\*\* = Highest importance  
 \*\*\* = Extremely high importance  
 \*\* = Very high importance  
 \* = High importance

These flags are based on a combination of (1) how rare the species or community is and (2) how large or healthy its examples are in that town. Please contact the Natural Heritage Bureau at (603) 271-2214 to learn more about approaches to setting priorities.

July 2013

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(Source: <http://www.nhdfi.org/library/pdf/Natural%20Heritage/Townlist.pdf>)



# D. Innovative Land Use Handbook – Site Plan Review and Subdivision Regulations Model Language and Guidance for Habitat Sensitive Site Design and Development Practices

## Model Language and Guidance for Implementation

### HABITAT SENSITIVE SITE DESIGN AND DEVELOPMENT PRACTICES

These practices may be used in three ways:

1. As an educational tool for citizens and developers to encourage voluntary practices for habitat sensitive site design.
2. As a checklist for conservation commissions and planning boards in reviewing applications and suggesting voluntary alternative site designs and development practices at the planning stage.
3. As elements of a performance zoning ordinance that awards density bonuses or requires compliance with the checklist items as a condition of subdivision approval.

A pre-application review meeting between the developer and planning staff to discuss the checklist elements is strongly encouraged.

### MODEL LANGUAGE FOR SUBDIVISION AND SITE PLAN REVIEW REGULATION AND CHECKLIST

#### I. PURPOSE

The purposes of this section are:

- A. To protect and maintain the natural environment.
- B. To provide for green spaces of adequate proportions.
- C. To provide a habitat for wildlife.
- D. To minimize soil erosion, lessen air pollution, conserve energy, and protect the quality of groundwater.
- E. To provide for the harmonious and aesthetically pleasing development of the municipality and its environs.
- F. To protect the public benefits of habitat protection, including flood control, water recharge, carbon sequestration, food web integrity, and nutrient cycling.

#### II. APPLICABILITY

This regulation applies to all applications for new development requiring site plan review and applications for the subdivision of land.

Option: A municipality might choose to limit the applicability of these requirements to certain areas of the community (e.g., an overlay zone consisting of those areas identified as important habitat within a natural resource inventory or open space plan) or to parcels of a certain size (e.g., any parcel greater than 10 acres). An overlay zone would be established through a separate zoning action.

### III. AUTHORITY

- A. **RSA 674:16 II. Subdivision Regulations.** The power to adopt a zoning ordinance under this subdivision expressly includes the power to adopt innovative land use controls which may include, but which are not limited to, the methods contained in RSA 674:21.
- B. **RSA 674: 21 (j). Innovative Land Use Controls/ Environmental Characteristics.** An innovative land use control to protect specific natural resources or features based on scientific evidence and community input may be adopted under RSA 674:21 when supported by the master plan and contains within it the standards that shall guide the person or board which administers the ordinance.
- C. **RSA 674: 21(h) Innovative Land Use Controls/ Performance Standards.** An innovative land use control to control the physical characteristics and operations of a proposed use may be adopted under RSA 674:21 when supported by the master plan and contains within it the standards and criteria against which the development will be evaluated.
- D. **RSA 674: 17 (h) and (i) Purposes of Zoning Ordinances.** To assure proper use of natural resources and other public requirements and to encourage the preservation of agricultural lands and buildings.

### IV. FINDINGS AND PRINCIPLES

It is the finding of this board that, in order to achieve the purposes above, the following principles will significantly enhance the protection of wildlife habitat at the site level and contribute to the protection of habitat at the watershed and regional level by:

- Maintaining the ability of ecological systems to provide ecosystem functions necessary to maintain wildlife habitat and the multiple benefits to wildlife and humans provided by such habitat.
- Maintaining unfragmented habitat blocks.
- Connecting habitat patches, facilitating wildlife movement through the area.
- Protecting wildlife from the negative impacts of development, including not only negative impacts to the habitat itself, but also to animal behavior and life cycle activities.
- Requiring site-specific habitat assessment and other practices described more fully below to protect wildlife from the negative impacts of development.

### V. DEFINITIONS

**Deer Wintering Area:** An area used by deer during winter for shelter. Also called a deer yard. Deer wintering areas are typically comprised of dense softwood cover with a crown closure greater than 60 percent.

**Habitat:** An organism's home, including the area used in all parts of its life cycle, such as feeding, breeding, egg laying, or bearing young.

**Mast Stand:** An area of woody plants, such as oak, hickory, beech, maple, and various pines, that produce dry fruit (mast), which is a food source for a variety of mast-dependent wildlife such as deer, turkey, and squirrels.

**Riparian:** Related to or adjacent to a stream or watercourse, or having a high water table because of proximity to an aquatic ecosystem or subsurface water. Although originally associated with rivers and streams, this term is now also sometimes used to describe wetland areas not necessarily associated with rivers or streams.

**Vernal Pool:** A confined basin depression that is covered by shallow water usually for at least two months in the late winter, spring, and summer, but may be dry during much of the year.

**Wetland:** An area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include, but are not limited to, swamps, marshes, bogs and similar areas.

## VI. HABITAT-PROTECTION SITE PLAN AND SUBDIVISION REVIEW CHECKLIST

The following checklist shall be utilized in the review of all site plan and subdivision applications. The board shall determine, on a case-by-case basis, and as applicable, whether the applicant's proposed development is consistent with these principles:

- A. Does the applicant conserve rare and outstanding landscape features, including unique or critical habitats, by directing development to other areas?

Yes \_\_\_\_\_ No \_\_\_\_\_

**Required action:**

- Conduct a site assessment of existing resources, identify areas for protection and associated buffers, and demonstrate methods that will be utilized for protection in the construction sequence section of the plan set.
- Development is directed away from habitat types that are rare statewide or to a particular geographic region.
- Development should be directed away from salt marshes, riparian areas, vernal pools, emergent wetlands, large wetland complexes (i.e., wetlands greater than five acres or clusters of wetlands), south-facing slopes, open fields, agricultural lands, and mast stands.
- Building envelopes are specified to control the location of future development.
- Avoid locating roads within or near important habitat or forage areas such as mast stands, deer wintering areas, or vernal pools.

- B. Does the applicant maintain significant buffers of undeveloped land between important habitat areas and developed area?

Yes \_\_\_\_\_ No \_\_\_\_\_

**Required actions:** Applicant must maintain appropriate buffers for the protection of habitat areas on the parcel as follows:

- Maintain vegetated buffers for wetlands and surface waters including riparian buffer areas. The most effective buffer strips will consist of a series of vegetation of different heights beginning with a grassy strip graduating to a strip of shrubs, and ending with a forested strip along the stream bank. The multiple series approach provides multiple benefits including stream bank stabilization. A generally accepted width for a buffer for wildlife habitat is 300 feet; for water quality, a buffer of 50 to 100 feet is recommended for most situations. Where high sediment loads or steep slopes exist, the water quality buffer should be expanded about five feet for every 1 percent increase in slope. (Connecticut River Joint Commission 2000; J.C. Klapproth 2000; Wenger 1999; Hodgman 2006).
- Maintain at least 200 feet of buffer from the perimeter of core areas of identified deer wintering areas.
- Maintain a minimum 300 feet of buffer from other significant habitat areas identified by the municipality, local or regional open space or habitat protection plan, or during site plan or subdivision plan review.
- Maintain a buffer of 400 feet around existing vernal pools and maintain a mostly closed canopy of trees within 100 feet of any vernal pool.
- Avoid construction of houses within 300 feet of important mast stands and avoid construction of paved roads within 200 feet of important mast stands.
- Avoid fragmentation of connecting areas between habitat areas and buffer areas.
- Mark areas of vegetated buffers and soft (graduated) edges of conservation areas with permanent monuments or signage indicating that the area is A NO CUT/ NO DISTURB VEGETATED BUFFER.

C. Does the applicant identify and conserve wildlife corridors of a minimum width of 300 feet through the property to facilitate wildlife movement within and across developed areas?

Yes \_\_\_\_\_ No \_\_\_\_\_

**Required action:**

- Conduct a site-specific wildlife assessment to identify appropriate corridors through a property or reference the town's Natural Resource Inventory or other local or regional assessment identifying appropriate corridors.
- Construct adequately sized underpasses or tunnels across roadways at known reptile and amphibian crossing sites and overpasses or underpasses across roadways along wildlife corridors.

D. Does the applicant maintain the structure and function of aquatic systems?

Yes \_\_\_\_\_ No \_\_\_\_\_

**Required actions:**

- Layout of development eliminates or minimizes stream and wetland crossings by roadways and driveways.
- Use a bridge span to cross river, streams or wetlands whenever possible.
- Stream and wetland crossings are eliminated whenever possible. When necessary, stream and wetland crossings shall comply with state recommended design standards to minimize impacts to flow and animal passage. (See NH Fish and Game Department, 2008.
- Maintain a 300-foot vegetated buffer on either side of a stream crossing.
- Stormwater management practices are used to prevent the direct discharge of stormwater to aquatic systems, including wetlands and small streams.

E. Does the applicant minimize the clearing, grading, and compaction of soil during construction activities?

Yes \_\_\_\_\_ No \_\_\_\_\_

**Required actions:**

- Cut and fill is minimized, with the maximum height of any fill or depth of any cut area, as measured from the natural grade, not greater than 10 feet, and is preferably limited to four to six feet.
- Development follows the natural contours of the landscape to the maximum extent possible to minimize grading.
- The smallest feasible equipment is used during construction and every effort is made to minimize travel over the area.
- Soils are re-aerated after construction is complete and prior to seeding and landscaping.
- Provide for six to 10 inches of top soil post-construction to any areas previously disturbed prior to seeding and landscaping these areas.

F. Does the applicant provide for the protection of vegetated buffers, stands of mature trees, and other vegetation to be preserved during and after construction?

Yes \_\_\_\_\_ No \_\_\_\_\_

**Required actions:**

- Important mast stands and other vegetation to be protected during construction are clearly marked, including area out to the drip line of the tree.
- Not allow construction materials to be stored over the root zone of trees.
- Mark areas of vegetated buffers and soft edges of conservation areas with permanent monuments or signage indicating that the area is a no cut/ no disturb vegetated buffer.

- Submit a tree clearing plan, indicating areas of trees to be cleared, and areas to be protected, and retain, at the applicant's expense, a qualified natural resources professional to review the applicant's plan.

G. Does the applicant attempt to mimic features of the local natural landscape in developed areas?

Yes \_\_\_\_ No \_\_\_\_

**Required actions:**

- Maintain existing foliage height diversity, to provide a range of habitat through layers of vegetation, such as ground covers, shrubs, and trees.
- Minimize edge effects by creating soft edges between developed areas and conservation areas using a graduation of smaller shrubs to larger shrubs to small trees to larger trees.
- Utilize native, non-invasive species in landscaping.
- Minimize the amount of area per lot converted from existing vegetation to lawn.
- Provide a stormwater management approach that maintains the natural peak flow and total volume of flow off-site pre- and post-development by providing for best management practices that capture, treat, and infiltrate stormwater in smaller-scale management areas throughout the development.

H. Does the applicant minimize the negative effects of development on wildlife and discourage human-wildlife conflicts by using such methods including but not limited to: directing light away from stands of trees, fencing gardens, pet food areas, and covering and fencing trash disposal areas?

Yes \_\_\_\_ No \_\_\_\_

**Required actions:**

- The homeowners association's documents should include the specific measures that will be used to ensure that the development will minimize potential negative effects on wildlife and habitat, and that human-wildlife conflicts such as predation or nuisance animal incidents will be discouraged by ensuring that garbage, pet food areas, and small pets do not serve as a food source to area wildlife. The documents should also address landscaping and discourage the introduction of invasive species and excessive use of nitrates and phosphates.
- Some areas of the development near homes may require fencing or other measures to deter wildlife from gardens and yards.
- Lighting must be fully shielded and directed away from stands of trees or other habitat areas so as not to disrupt animal behavior.